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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the club was held in the Royal Society's Hall on Monday, April 8, 1929. The President (Mr. F. E. Wilson, F.E.S.), occupied the chair, and there were about 130 members and visitors present.

CORRESPONDENCE.

There was no correspondence to bring before the meeting.

REPORTS.

Reports of excursions were given as follows:—Zoological Gardens, Mr. L. L. Hodgson; Werribee Gorge, Mr. A. L. Scott; Botanic Gardens, Mr. F. Pitcher; Warburton, Mr. A. E. Rodda.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As country member, Mr. A. Morris, Broken Hill, N.S.W.; and as ordinary members, Miss Gladys Onians, Malvern, and Mr. H. M. Beck, Oakleigh.

GENERAL.

Mr. V. H. Miller drew attention to the illegal removal of ferns from the Warburton gullies, and moved that the Minister for Forests be written to, urging that more notices be posted in the gullies near the township prohibiting the practice. At the suggestion of Mr. H. McColl, a similar request for the inclusion of the Kinglake district was included in the motion, which was seconded by Mr. A. E. Rodda and carried.

Mr. F. G. A. Barnard moved that a letter of congratulation be sent to Sir A. E. Kitson on his recent appointment as President of the Geological Section of the British Association for the Advancement of Science. Mr. F. Pitcher seconded the motion, which was carried.

EXHIBITION OF AQUARIA.

A very good exhibition of aquaria, consisting of fish, newts, pond snails and aquatic insects, was shown in several large glass tanks and other receptacles. Mr. C. Barrett, C.M.Z.S., introduced the subject, and said that the keeping of aquaria was a very old hobby which, until late years, in Australia, had not been much in vogue. Recently there had been a considerable revival in other States, and it had now come to Melbourne.

Mr. F. Lewis, Chief Inspector of Fisheries and Game, followed, dealing principally with small Australian fishes, many of which were hardly known to naturalists. He exhibited

four species which he considered would be suitable for aquaria.

Mr. H. W. Davey, F.E.S., spoke on the keeping of Japanese and Spanish newts, of which he exhibited living examples, and gave many useful hints as to their care and management.

Several questions from members were answered by Mr. Lewis and Mr. Davey.

Mr. F. G. A. Barnard moved that a hearty vote of thanks be tendered to the gentlemen who had spoken, and also to Mr. de Norville, who had brought several splendid aquaria for exhibition. Mr. G. Tranter seconded the motion, which was carried with acclamation.

EXHIBITS.

By Mr. H. P. McColl:—Flowers of *Callistemon lanceolatus*, from a plant that flowers twice yearly.

By Mr. W. H. Nicholls:—(a) *Pterostylis decurva*, Rogers. New locality, Mt. Teneriffe, near Riddell, flowering unusually late for a Summer orchid. (b) Cast-off skin of Brown Snake, 6 feet 6 inches long, found near St. Albans.

By Miss C. C. Currie:—Flowering specimens of cultivated Australian plants: *Solanum aviculare*, *Acacia iteaphylla*, *Acacia Maidenii* and *Crotalaria laburnifolia*, grown by the exhibitor at Lardner; also, early flowers of *Boronia anemonifolia*, from Sale, and flowers of *Metaleuca filifolia* and *M. cordata*, grown by Mr. T. A. Robinson, at Dutton.

By Mr. Thos. Kerr:—Flowers of the Garland Lily, *Calostemma purpureum*, growing at Leeton, N.S.W., and fruiting plants of Rice, from a plantation at Leeton.

By Mr. H. B. Williamson:—Specimens of *Babbagia acroptera*, F. V. M. and Tate, var. *deminuta*, J. M. Black, and *Kochia oppositifolia*, F. V. M., from the Pink Lakes; *Atriplex campanulatum* Benth., *Bassia divaricata*, F. V. M., and Mildura, collected by the exhibitor; all to be added to the Victorian Census; also specimens of *Threlkeldia salsuginosa*, for comparison with *Babbagia*.

By Mr. F. Lewis (Chief Inspector of Fisheries and Game):—Several species of fresh-water fishes (in aquaria).

By Mr. H. W. Davey, F.E.S.—Living specimens of Japanese Newts.

By Mr. De Norville.—Goldfishes and other species, in large aquaria tanks.

By Miss J. W. Raff, F.E.S.—(a) Life-history of *Myrmecoleon inopinus*, a Queensland Ant-lion (larva, cocoon with cast pupal skin, and adult).—illustrating paper in April "Naturalist." (b) Water Fleas, Snails, Yabbies, etc. (in aquarium jar), chiefly from the Lake, University grounds.

FORMS AND HABITS OF CERTAIN ORCHIDS.

BY THE REV. H. M. R. RUPP, B.A.

Orchids, as a class of flowering plants, may be described as notoriously unconventional—a characteristic which at least in part explains their fascination. There are interesting facts, most of which are as yet very imperfectly accounted for, in connexion with the forms and habits of many Australian orchids, which seem to be worthy of careful investigation by observers who may have good opportunities of studying them. It occurs to me that it may be useful to call attention to such of these as have come under my own notice. Except in one or two instances, I have not been able to reach any satisfactory explanation of them; but a statement of the phenomena which they present may serve to stimulate interest. I propose to deal with them under the following headings:—

1. The occurrence of "giants and dwarfs" in certain species.
2. Elongation of the flowering stem after fertilization.
3. Anomalies of habitat.
4. Anomalies of the flowering season.
5. Habits in connexion with basal leaves of terrestrials.

1.—GIANTS AND DWARFS.

The individuals of any species, of course, vary considerably in dimensions according to influences easily understood. Such variation, however, does not seem to account for the consistent occurrence in certain species of giant forms, differing so notably from the type in appearance, that were it not for the identity of structural detail, specific separation would be inevitable. The giant and the dwarf type appear to grow under precisely similar conditions, often in the same locality. Consistently diminutive forms also occur, but more rarely. *Caladenia carnea*, the commonest species of the genus in the eastern States, includes both a giant and a dwarf. Traveling northward, the former probably begins on the Newcastle side of the Hawkesbury River, extending thence right up into the tropics, and apparently to Java. Dr. R. S. Rogers has named this form var. *gigantea*. I have measured flowers, from the Myall Lakes district, over two inches from tip to tip of the segments. The colour varies far less than in the type, being usually bright rose-pink; the flower is always strongly musk-scented. Frequently, the common small type-form occurs—at least in New South Wales—in the same locality, and it is difficult to suggest any cause for the very striking differentiation.

The dwarf *C. carnea* (var. *pygmaea* Rogers) differs from the type in the opposite direction, the diameter of the flower from tip to tip not varying much from 10 mm. It is pale pink or whitish, and almost scentless. Both giant and dwarf have the characteristic barred labellum and column of the species. Dr. Rogers records the dwarf from South Australia, Victoria, and Flinders Island; I have found it in New South Wales and southern Tasmania.

In Victoria there occurs a giant form of *Pterostylis acuminata*. This seems a parallel case with *Caladenia carnea* v. *gigantea*, and one finds it most difficult to accept the Victorian giant as a form of the typically slender and dainty *P. acuminata*; but there is nothing in the floral structure to justify separation.

Among the epiphytes, *Dendrobium speciosum* includes both giant and dwarf flowers, but there are many intermediates linking them. One form seems to come between the type and the Lord Howe Island *D. gracilicaule* v. *Howeanum*; but it seems unlikely that these two could ever have been associated. The form in question far more closely resembles a large *D. gracilicaule* than a *D. speciosum*; but the flowers agree so exactly with small-flowered, robust forms of the latter that, having mixed up three of each in a box, I was quite unable to sort them out. *D. tetragonum* exhibits two very distinct forms of flowers, one twice as long in the segments as the other, and consistently more richly coloured. *D. teretifolium* possesses a still more striking giant flower, the segments being nearly three times as long as in the type.

In all these cases there does not appear to be anything in external conditions which might cause the great differentiation. Hybridization naturally suggests itself; yet it is remarkable that in no case is there anything in the character of the floral structure providing a key to the identity of the other species possibly concerned.

3.—ELONGATION OF FLOWERING-STEM AFTER FERTILIZATION.

This is a very interesting habit among some of our terrestrials. It has been recorded in all our Australian species of *Corysanthes*, but is more consistent in some than in others. The elongated stem is often coloured a rich red. The New Zealand species, only one of which occurs in Australia, also have the habit, and one elongates the leaf-stem. This latter point cannot be explained by the most popular theory of stem-elongation, viz. that it is a device for elevating the ovary from its position close to the ground, in order that the wind may more effectually scatter the seed. I confess that this

theory does not satisfy me, and that I regard it merely as an obvious hypothesis, "not proven." My reasons are these: (i.) There are hundreds of other plants which flower as close to the ground as *Corysanthes*, yet succeed in dispersing their seed satisfactorily without elevating the ovary. (ii.) These plants are more dependent upon seed for propagating their species than is *Corysanthes*, which so largely uses the vegetative method; if elevation of the ovary were necessary, we should expect to find it more marked in plants which do not use the vegetative method. (iii.) The habit is very inconstant in all but one or two of our species of *Corysanthes*; I have often seen the ripe capsules of *C. pruinosa* and occasionally of *C. bicalcarata* (which seems to produce seed rarely) without stem-elongation. (iv.) *C. dilatata* in the southern States often grows high up on fern-tree trunks in sheltered bush forests, where wind scarcely penetrates; yet in this position the orchid almost invariably elongates the stem.

Moreover, stem-elongation is not restricted to orchids which have flowers approximately squat on the ground. In *Chiloglottis* it is practised by the well-stalked species, and not only by such forms as *C. Gunnii*. I have also observed it among the smaller species of *Prasophyllum*. I cut off a stem of *P. intricatum* close to the soil, when the flowers were well matured. The stem subsequently grew up eight inches from the level where it had been cut. Mr. H. B. Matthews, a New Zealand observer, states that *Pterostylis Allisonii* also has the habit. It would be of interest to know whether it occurs in the squat form of *P. cucullata* in our southern States. Mr. Matthews has suggested that the habit may perhaps in part be accounted for by surplus energy stored in the current year's tuber.

3.—ANOMALIES OF HABITAT.

On the Barrington Tops plateau, in New South Wales, are countless myriads of a little blue-grey, delicately-perfumed *Diuris* (*D. venosa*). With *Prasophyllum odoratum*, it is the commonest orchid on those high moorlands. The *Prasophyllum* extends freely to Victoria, South Australia, and Tasmania. The *Diuris* has never been seen except on the Barrington Tops. Why? Is there any particular reason why it should not occur at least on similar elevated table-lands?

In the brushes of the Paterson Valley, the absence of *Dendrobium tetragonum* is rather remarkable. All the other orchids with which it is usually associated in adjoining localities are there, nor does there seem to be any conceivable reason why it should not grow there. For several years I have searched for it, as have also other observers; not a trace

of it can be found. In the lower part of this valley, the brushes on the eastern side contain innumerable plants of *Sarcophilus olivaceus* and *S. Hillii*, but I have only once seen *S. divitiflorus* there, and *S. falcatus* not at all. In similar brushes a mile or two to the west of Paterson, the two last-named are plentiful, while *S. olivaceus* and *S. Hillii* are extremely rare. Other epiphytes are common on both sides.

In 1923, on the western slopes of the Alum Mountain, at Bullahdelah, I found two specimens of a *Caladenia* supposed to be restricted to South Australia and Victoria, and named by Dr. Rogers *C. tutelata*. Dr. Rogers identified one of the plants himself. As far as I know, the species (by no means inconspicuous) has never been seen elsewhere in New South Wales, and the Alum Mountain is probably 700 miles from its nearest recorded Victorian locality. Somewhat analogous is the case of *Diuris brevifolia* Rogers, also supposed to be a southern plant, but forwarded to me, in 1928, from the scrub country behind Manly Reservoir. In this case, however, the plant might be taken for a small, pale-flowered form of *D. sulphurea*, unless carefully examined, and its identity may not have been recognised elsewhere.

4.—ANOMALIES OF THE FLOWERING SEASON.

The flowering-time of orchids offers some puzzling problems. In certain species it may be safely forecasted (at least in some districts known to me) "almost to the day"—e.g., *Calanthe veratrifolia* and *Sarcophilus divitiflorus*. In others, such forecasting is impossible. In my fernery I have had three plants of *Cleisostoma tridentatum*, all from similar situations in the same district. One flowered in August, one in October, and one in January. *Sarcophilus falcatus*, and *Cymbidium suave* exhibit similar strange irregularities. *Dendrobium Morletii* and *D. cucumerinum* may have two "crops" of flowers, separated by about two months, while *D. monophyllum* gives the impression of producing flowers just when it feels disposed, irrespective of the season.

I have seen *Spiculoca irritabilis* produce one or two flowers on a stem holding numerous very immature buds, which developed some six weeks afterwards. *Pterostylis parviflora*, a plant of most perplexing variability, appears to flower in one locality or another almost throughout the year. I have had specimens in January, March, April, May, June, October, and December. *P. acuminata*, appearing in New South Wales as early as March, is a springtime orchid in Victoria. I have seen Victorian specimens of the typical form as well as the "giants" mentioned above.

One naturally expects a flower occurring in both warm and cold climates to be earlier in the former, later in the latter. In the case of autumn-flowering plants, however, the order appears to be reversed. *Eriochilus cucullatus*, a characteristic autumn orchid of our temperate and warm districts, is also common in colder climates; but there it is definitely a summer flower (Barrington Tops, New South Wales, and Cradle Mountain, Tasmania, in January).

5.—BASAL LEAVES OF CERTAIN TERRESTRIAL ORCHIDS.

There are interesting features in this connexion among some species of *Pterostylis*. Mr. W. H. Nicholls (see *Victorian Naturalist*, December, 1925, and June, 1928), has done valuable work which involves some treatment of the basal or "juvenile" leaves of the Greenhoods, but much remains to be investigated. In most of the species which have developed stem-leaves, the basal rosette so characteristic of other forms is absent from the flowering stem, but is present in a modified form on a short stalk close to it, or even attached to its base.

In this case, as in the case of the rosette actually encircling the flowering stem, the basal leaves are developed before the latter. But whereas (with one or two exceptions) the rosette round a merely bracteate stem persists through the flowering period, that which subtends a leafy stem usually perishes before this period is reached. In cool, sheltered positions this may not happen, but it is the general rule. In two instances where the plants obviously belong to leafy-stemmed sections (*P. parviflora* and *P. Daintreyana*), the stem-leaves are very poorly developed. In both these plants there is a fairly vigorous basal rosette, which sometimes encircles the stem and sometimes is separated from it, and this rosette may either perish early or persist long after the flowers are withered.

In the case of *P. parviflora*, on the Barrington Tops, I found that the rosette actually did not develop past a very immature stage until after the plant had flowered.* Some species (*P. Baptistii*, *P. nutans*) show a tendency to disperse the basal rosette into a scattered leaf-growth along the stem; in *P. Toveyana* this tendency appears to have become a definite habit.

In *Eriochilus cucullatus*, the single basal leaf is frequently (especially in colder climates) extremely immature at flowering-time. Subsequently it develops fully, and persists for several months after the stem and flowers are dead. In *Spicu-*

*Note.—Since writing the above I have found reason to believe that this commonly occurs also with *P. reflexa*.

loos irritabilis, the basal leaves (two to five, more or less flat on the ground) are often said to be absent at flowering-time. My experience, in a locality (Bullahdelah) where this orchid is in great abundance, was that complete absence of the leaves was most exceptional. They are commonly separate from the flowering stem, though cases of attachment are not rare. When not attached directly to the stem, they are either on a stalk of their own arising from the same root-system, or belong to other plants which are not flowering. So far from being absent, they have usually been my surest guide to colonies of this interesting little orchid at flowering-time. They persist for some time after the flowers are gone.

ETHNOLOGICAL SECTION.

The monthly meeting of this Section was held at Latham House on April 16th. Mr. A. S. Kenyon in the chair. The syllabus item was a description of the recently-discovered aboriginal petroglyphs in a rock-shelter or cave, near Mt. Langhighiran. Mr. Kenyon described the place and the various rock markings, comparing these with similar remains in other parts of Australia.

In regard to the pictographs, Mr. Kenyon advanced the theory that the first steps in making them arose from imitating tracks or footmarks of animals, such as the kangaroo, emu and opossum; and that certain markings, in time, became conventionally used and significant of animals themselves. Later they might have a secondary symbolic, or sacred meaning. Certain signs were common to rock caves—Chusingas, weapons, ground drawings, rock carvings and pearl-shell ornaments.

Photographs of the rock-shelter and diagrams illustrating the signs and stencilled hand prints were shown. A general discussion on the genesis of aboriginal pictorial representation took place. Mr. Kenyon also exhibited scrapers and points from the Mallee, Langhighiran and Nanaambial Creek; Mr. V. H. Miller a hammer-stone; Mr. W. H. Gill, some fine Chusingas in wood and stone, from Central Australia and North-West Australia; Mr. J. A. Kershaw, a South African figured gourd, a throwing stick and woomera from the North-West.

It was decided to devote next evening, Tuesday, May 21st, to a consideration of early African culture, for the illustration of which specimens are invited. It was arranged to have an excursion to the aboriginal diorite quarries at Mt. William on May 5. Before settlement in Victoria, this locality was the chief source of material for the making of stone axes of diorite, the composition of which made it specially suitable for producing the best type of axe in use. The material was widely distributed by barter throughout Victoria and Riverina.

Satisfaction was expressed at the appointment of Professor Wood-Jones to the Melbourne University, his interest in ethnology being well known.

Club members are cordially invited to meetings of the Section.

UNUSUAL OCCURRENCE OF SWIFT MOTHS.

BY JAS. A. KERSHAW, C.M.Z.S.

With the heavy rains which fell on April 3 and 4 appeared unusually large numbers of Swift Moths, so called because of their extremely rapid, though somewhat erratic, flight.

In Victoria there are several species, the commonest in the southern districts being *Trictena labyrinthica*; while *Piclus hyalinatus*, and possibly two or three other species, occur in the western, northern and eastern portions of the State. They are all night-fliers, emerging from their chrysalides towards evening, usually after heavy rain.

Their appearance was first noticed on the evening of April 3 among the hills some ten miles north of Kilmore, when numbers were attracted to the lights of stationary motor-cars, and dozens of others were seen on the road. Having no means of killing or preserving them, I again visited the locality on the following day, expecting to find them resting on the tree trunks; but, although I saw numerous wings, the remnants of specimens evidently captured by birds and other animals, I succeeded in finding only a female. Large numbers of empty pupa cases were, however, found projecting from their underground tunnels, in one place more than 50 being counted, in a space of a few square yards.

Early in the evening a violent thunderstorm occurred, accompanied by very heavy rain, and just about dark hundreds of the moths appeared, dropping on to the road or dashing themselves against, and into, the car. Moths were observed almost continuously, from High Camp (beyond Kilmore) to Campbellfield—a distance of some 38 miles; and it was noticed that the greatest numbers appeared in the vicinity of eucalypts growing along the roadside. The great majority were *Trictena labyrinthica*, but a few males of the somewhat smaller northern form, usually known as *Piclus hyalinatus*, were taken. The females, immediately after capture, commenced to eject enormous numbers of minute, creamy-white eggs, which, after a short exposure, changed to a glossy black.

About the same time, these moths occurred in several localities nearer Melbourne, and dozens of their empty pupa cases were noticed in a paddock at Mentone.

The larvae are grub-like in appearance, and subterranean in habit, boring deeply into the hard soil and feeding upon roots of trees. They are often attacked by a curious fungus

(*Cordiceps*), which transforms them into the so-called "vegetable caterpillars." The pupae, some of which measure nearly six inches in length, are furnished with transverse rows of toothed ridges on the dorsal surface of the abdominal segments, by means of which they work their way to the surface when the moth is ready to emerge.

The occurrence of numbers of these moths, at this time of the year, is not unusual; but I have never experienced them in such great numbers as on this occasion.

CYLINDRACHETA NOT AN EMBIID.

In some notes on *Cylindracheta* (*Victorian Naturalist*, XLIV., pp. 266-7), I referred to the difference of opinion respecting this curious insect, the problem it has presented to systematists. When originally described, it was believed to be a degenerate kind of mole-cricket; but, subsequently, Giglio-Tos expressed the opinion that *Cylindracheta* might be a "web-spinner" (Embiid). Anatomical evidence that it is a Gryllotalpoid is given by Dr. G. C. Crampton, in a recent paper (*Entomolog. Mitteilungen*, XVII., 1928, No. 1, pp. 252-7).

Dr. Crampton is a brilliant American scientist, whose special subject is insect morphology. He has also done valuable research work on the heads of Arthropods, seeking among the crustacea for the precursors of the various insectan structures. His material included specimens of *Anaspides* and *Koomunga*, our very primitive crustaceans. He maintains that the crustacea are like the common ancestors of the insects and "myriopods," from a study of the head structures alone.

As regards *Cylindracheta*, Dr. Crampton considers that the anatomical evidence is ample to indicate that Gray, Kirby, and others, were correct in assigning it to a position among the Gryllotalpoides. Comparative morphology plainly shows the resemblance. Subsequent to the publication of his paper, Dr. Crampton received specimens of the Australian and South American *Cylindrachetas*—originally, he had only one borrowed specimen, which he was using to illustrate a series of comparisons of the terminal structures of insects in general so was unable to make an extensive comparison between the two types of Gryllotalpoids.

After examination of ample material, Dr. Crampton was confirmed in his view. "There is not the slightest doubt," he writes to me, "that *Cylindracheta* is a Gryllotalpoid." He urges all systematists to know a little of comparative anatomy, and a great deal of the special anatomy of the group of insects with which they are concerned.

C. BARRETT.

In spite of the unpromising weather, eleven members, including two ladies, attended the excursion to Werribee Gorge on March 18. The party proceeded, by motor, from Bacchus Marsh railway station to the Gorge, where many of the points of geological interest were inspected and discussed.

A. L. SCOTT

DENDROGLYPHS, OR "CARVED TREES."

BY CHARLES BARRETT.

"Canoe-trees" are not rare in Victoria and sometimes are called "carved trees"; but in our State, true dendroglyphs are lacking. In New South Wales, "the country of dendroglyphs," they have been found in numbers, and the markings are of great variety. Many specimens have been collected for museums, but some remain in situ where the trees grew, or the marked boles were erected by the aborigines.



Recently I received from Mr. G. A. Mackett, of Lake Cargelligo, N.S.W., photographs of two notable carved trees, at the spot where Surveyor-General Oxley camped, on the Lachlan River, in July, 1817. Oxley gives a plate (*Journal of Two Exped. into N.S.W.*) of the remarkable semi-circular tumulus, with tiers of seats around one portion of it, which he discovered near Gobothery Hill, between Lake Cargelligo and Condobolin. He has the distinction, as Etheridge states, to be the first author to record dendroglyphs in connection with an Australian aboriginal interment.

These trees (cypresses) stood, one to the west, the other to the north of the tumulus. In 1913—nearly a century after the explorer's discovery—the spot was located by Mr. E. Milne, one tree being intact. The stump of the second tree showed only the lower portion of the original carving. Mr. Crockett writes: "These trees signify the site of tribal warfare, burial and ceremonial grounds."

When Oxley opened the first of the three mounds discovered, he found in it nothing except ashes, whether of bones or wood could not be determined: "A semi-circular trench was dug round one side of it, as if for seats for persons in attendance." On the same plain, the explorer came upon a similar tumulus—a conical mound of earth, nearly eight feet in length and about four feet in height at the centre. Within this mound, deep down in the central portion, he found the remains, apparently, of a human body. It had evidently been placed upon sticks. The tumulus was overgrown with plants, and had all the appearance of antiquity.

Subsequently, Oxley discovered still another mound, which seemed to be of recent origin. This was the tumulus of the carved trees, and contained, in an oval grave, the body of a tall, finely-built man, bent up, knees to the head, and wrapped in many opossum skins. Compare the photographs here reproduced with the trees in Oxley's sketch of the scene, and you will see that the carvings on the boles were faithfully copied by their discoverer.

Dendroglyphs are of absorbing interest to the ethnologist, and, fortunately, we possess a finely-illustrated guide to their study, "The Dendroglyphs, or 'Carved Trees,' of New South Wales," by R. Etheridge, jun. (*Mem. Geol. Survey of N.S.W., Ethnological Series, No. 3*). This memoir deals fully with the subject; and since its publication, in 1918, little of importance has been added to our knowledge of dendroglyphs. Doubtless more carved trees have been discovered, but the problems presented by dendroglyphs are not nearer to solution. We owe much to the researches of Etheridge, and I, as a believer in the great antiquity of man in Australia, am glad to know that his conclusions support that view, which is steadily gaining ground, because of increasing evidence. Etheridge, keen minded and no "romanticist," ends his memoirs on carved trees with a philosophical summary. "One can only conclude," he writes, "that this dendroglyph culture is of immense antiquity. We have before us . . . a

Plate I.



Photo by G. A. Crockett

Curved Tree, Found by Oxley.

neolithic people, amongst whom megalithic architecture was unknown, with an entire absence of pottery, but who, at the same time, prepared monuments to the memory of their dead, of which many 'may be described as elegant, and all represent strenuous mental and physical efforts.' Whence came this culture?"

There's the rub! If you reject the diffusion of culture theory so brilliantly expounded by Elliott Smith and Peiry, give another reasonable explanation of the cult of carved trees in Australia.

If it be of native origin, we must admit the antiquity of man in this country; if not indigenous, then it supports the diffusionist theory. Dendroglyphs are not confined to Australia. We guess and grope in the mists of old time; we dispute about shadows. But the dendroglyphs are solid facts, which may be used as a base for speculative building. Even the amateur, with an inquiring spirit, may be a minor builder; or, to change the metaphor, find tongues in these trees, and listen to fanciful stories. Science may translate them into its own language, and be no nearer to their true meaning than is the reader helped by imagination. The theory of to-day may die to-morrow.

The dendroglyphs have been variously interpreted. Some of the characters are mysterious as Minoan script, and the picture-writing of the Maya.

A FERN-TREE FREAK.

Branched tree ferns are uncommon in our ranges, and when a fair specimen was seen close to the "steps" on Backstairs Creek, during the recent Club excursion to Warburton, it immediately attracted attention. A closer inspection showed that the two heads were of different species, viz., *Dicksonia antarctica* and *Alsophila australis*. It was difficult, at first, to ascertain which was the original, but we decided that the *Alsophila*, showing the more vigorous growth, was the parasite. A.E.R.

Will any member, knowing of back numbers of the *Naturalist*, which may be available for purchase, please communicate with the Hon. Librarian? A good price will be paid for Volumes 2, 4, 9, 33 or 43, complete, or for certain desired parts of the volumes.

Copies of the First Supplement (Additions and Alterations 1929) to the Census of Victorian Plants, are now available, and may be obtained from the Librarian.

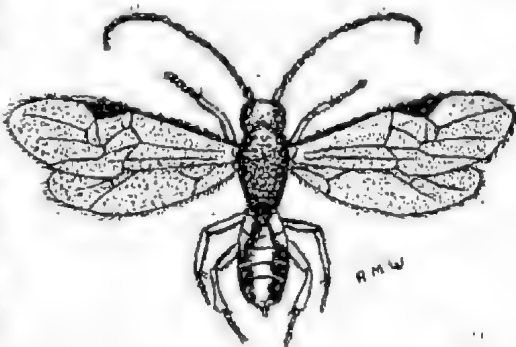
There are still a few copies of reprints of "The Lilies of Victoria" remaining in the hands of the Librarian. Price, 3d. (if posted, 4d.).

PARASITISM BY A BRACONID WASP.

At Upper Beaconsfield, one day in March, I noticed a peculiar white object hanging from a gum-tree twig. On closer examination it proved to be the full-grown larva of an Emperor Gum-moth, *Antheraea eucalypti*, almost completely covered by a mass of white material, like cotton wool.

This was the work of a wasp, of the family Braconidae, about 4 m.m. in length.

The female Braconid lays her eggs in the caterpillar, and the larva feed on the reserve fat tissue of the host without touching the vital organs, so that the caterpillar re-



mains alive until they pupate. When fully developed, the larvæ bore their way out, and pupate, after having spun a quantity of silk, which fastens the cocoons together.

On March 24, the wasps began to emerge, and on the 25th 292 were counted. For the next two or three days, wasps continued to appear; and when the cocoons were counted, the astounding total was 938—all from the body of one parasitised caterpillar! These cocoons averaged about 4 x 1.5 m.m., and opened at one end by an operculum, as in most species of Braconidae.

The text figure, of a female wasp, is magnified about ten times.

A. M. WARR.

BOOKS ON SPIDERS.

Interest in spiders has been stimulated by Dr. Pullen's delightful lecture before the Club recently. A standard work on the subject, both popular and scientific, is Professor J. H. Comstock's "The Spider Book," and owing to the generosity of Mr. V. H. Miller, a copy of this book will be added to the Club library—still another gift from our liberal-minded friend.

Mr. S. Butler, an authority on Victorian spiders, supplies the following notes:—I. Koch's *Die Arachniden Australiens*, 1884-9, is the main work on Australian spiders; it is a German book, rare and costly. *Système Araneorum*, by Dr. Alexander, Petrunkevitch, Professor of Zoology in the Yale University, published in the Transactions of the Connecticut Academy of Arts and Sciences (Vol. 29, January, 1928), contains a key to all families and sub-families, and a list of genera, alphabetically arranged, under each sub-family. It is printed in English.

MOORA STONES AND TRADITIONS.

By G. AUSTON.

Originally, to quote an old native, the aborigines of Australia lived "all a same like dingo." This state of things persisted until, one day, a man came from the south and taught the tribes that the promiscuous mating of men and women, without any method, was not good for the race.

After a long consultation with the old men, he gave each family a name, which he called *murdu*, or, as the tribesmen themselves call it, *matto*, and to the oldest man of each family he gave an emblem to represent the *murdu*. He used simple animals, lizards, snakes or camp objects to name the various families. The emblems that he gave were usually made out of sandstone, each one differing from the other. They were always in pairs; the stouter one was to represent the male element, and the thinner one the female element.

When he ran out of made-up stones, the man from the south used any material to hand. A piece of stone, roughly flaked to a point, would represent the male, and a wirragayon or pointing-bone the female element. In one case he chose a fine punyi or snake-charming bone to represent some girls of a neighbouring tribe, who happened to be visiting a family to which he had given the emblem of the frilled lizard.

The visitor passed on, and, according to local tradition, visited and named the tribes right up to where Cloncurry is now, in Queensland. He then returned, traversing the country where the overland telegraph now goes through from South Australia, and died near the north end of Lake Eyre. Two stones mark the place where he and his assistant died. Near by is a hill covered with cylindrical points, of apparently lightning-fused sand. Tradition has grown up to assert that these points were set up by the Moora, before his death, in commemoration of each family to whom he had given a moora.

No aborigine will now admit that there are other emblems than those made by the Moora, but a study of their traditions proves that emblems were made and conferred on families for some deed they had performed for the good of the tribes; possibly these newer emblems were not conferred until some generations after the people who had earned them had died. An instance comes to my memory. One Moora, who was notorious for his pursuit and molestation of women, so annoyed two lubras of the Pia Kooti (Black Swan) *murdu*, that they made a kirra (boomerang) and killed him with it the next time that he troubled them. In the course of time these women were granted emblems and they became Mooras

(Kirramurakoo—the boomerang makers), and their descendants claim the two murdus, that of Pia Kooti and that of the Kirramurakoo. The oldest son always calls himself Kirramurakoo, in commemoration. The emblems, in this case, were two slender sandstone cylindro-conical stones, almost exactly alike.

So much tradition has grown up about these stones that it would take several volumes to give even a brief summary, but the complaint of the old men is that the Moora who named the tribes did not tell them enough. He gave them names and forbade them to marry anyone of the same type of murdu as themselves, and told them that the children must always take the murdu of their mother; but he did not tell them where they were to get wives and husbands, when, in the course of time, as inevitably happened, the whole of each camp became of the one murdu.

It was this necessity of going abroad for wives and husbands that caused the wars and the migration of tribes. In their wandering in search of wives, a party of young men would find good water, with plenty of hunting and vegetable food; they would sit down then, which meant fighting when discovered by the rightful owners. If the interlopers held their own, others of their tribe would follow on, until the ownership of that water changed hands. In course of time the young men would range out further, and the same process would be repeated. But no matter how far the tribe ranged, the emblems of their home tribe stayed at the place where the Moora had first named them.

Through having to go abroad for wives, the home murdu gradually dropped out and was in danger of being lost; so the old men then ordered that the children, while complying with the order of the Mooras in taking the murdu of their mother, should also belong to the emblem of the tribes, which, for the sake of brevity, they called the Moora. So that a child born of a Red Ochre mother, who was married to a man who belonged to the Kadni horde, would belong to the Red Ochre murdu, but would also belong to the Kadni Moora.

The emblems were always passed on to the oldest descendant, male or female, of the original holder, and belonged to the holder for his or her life. In the event of the holder dying suddenly, or a long way from home, the emblems became lost. I can remember many frantic searchings for lost Mooras, when the deceased holder had instructed his inheritor of about where he had buried the emblems. One such was at Warrawalpina, on Cooper's Creek. The old man, when

dying at Kanowna, told that the Moora was buried on the one sand-hill at Warrawalpina. The day after he died, the whole tribe was there and searching the hill. They searched for a year, without success. They tell me that, now and again, some old fellow devotes a month or two to the quest. My own idea is that some white man has found the emblem, and either sent it down country or carried it a few miles and then lost it.

Any emblems that had lost their identity through having been lost were valueless to the finder; he could not know what moora they represented, and any interference with them would possibly have some ill-effect on the finder. Very often, when a line had died out, the finished moora was placed on, or in, the grave of the last holder—the holder had the right to have it buried with him, instead of passing it on, if he liked; but, in this case, it would be dug up in a year or two by its rightful owner, and would be just as good as ever.

For many years I had seen the bundles containing the mooras, in the possession of various old men and women, but my inquiries were always evaded, until about 1916, when some old men sent for me to visit them at their camp. They were old friends and privileged, so I went to them, wondering why they had sent for me instead of coming to my place. When I reached the camp the eldest greeted me with: "Pin-naroo, we four old men been talk. No more left belong to our Moora, so we give him to you. Him Pia Kooti (Black Swan), and him live at what white fella call Lake Gregory. Black-fellow call him Pia Kooti Pandoo." They then told me the legends connected with the moora, and asked me not to tell anyone. They intended to get the emblems for me some day, but, unfortunately, they all died before they got a chance. My moora is still buried somewhere on Lake Gregory.

The legends are all a piece of the Moora mosaic, which run right through the country, from away down in the south up to near Cloncurry, and further still, for all that I know. Various authorities give scraps of this legend, but most of them are really only fragments. No man living knows the whole of it.

Since I became the official head of the Piakooti Mooras, I have been shown several Mooras; one I bought from a mission-bred man, who had inherited it. He was dying of a malignant disease, and all of his children, mission-bred also, were too civilized to want the Moora; so he sold it to me to get extra delicacies in the way of food.

This was the Kadni Moora, which lived at Kallamurrina, on the Warburton River. It was learned afterwards that the

man was not entitled to it, for, though he belonged to the Kadai Murdu, he belonged to the Sun Moora, Ditcha. The Moora really belonged to Kirramurakoo, who also was the holder of the Kirra maker moora. Later, the old men of the tribe here gave me the moora who belonged to this place—the Red Ochre Moora. All of his descendants had died out, but, luckily, the burial place of the Moora was known to Kirramurakoo, who dug it up and presented it to me, wrapped in fresh emu feathers and fur string, and smeared with red ochre. He told me that the Moora would probably give me a bad time for a while, because it would be angry at having been neglected for so long.

So many superstitions have grown up around the original emblems that now any unusual stone is attributed to the original Moora. One tradition is that a crowd of young men once caught a big lizard in the Cooper. The big lizard—I presume that it was a crocodile—had drowned and eaten one of their number, and after they had pulled or knocked out all of its teeth, they let it go. The teeth were buried at Pando (Lake Hope), and in time they attained to the dignity of becoming Mooras. Anyone who was fortunate enough to get one of these teeth could swim in any water without being in danger of the Cuddi-mookra (uncanny reptiles that are supposed to live in deep water).

Probably only the actual crocodile teeth, plentiful anywhere in the lower reaches of the Cooper, were of value originally, but now any smooth stone resembling a crocodile's tooth has all of the alleged powers of the original teeth. These stones must, in some cases, have been carried about for years. I have one so highly polished, it seems to have been done artificially. But I have no doubt that it was polished only by the friction of carrying it in a string-bag for, possibly, hundreds of years. They are still known as Moora yakhurra (Moora's teeth).

I have in my collection a fish Moora from Andrewilla. Diamantina River. The male emblem is, roughly, about nine inches long by three inches wide, conical-shaped and a flattened oval in section. The female emblem is a stick of sandstone, about an inch in diameter by eight inches long, circular in section and blunt at both ends. Another unknown Moora I have is made of diorite, roughly ground to a conical shape, and polished smooth and black with long continued carrying. This specimen is five inches long by three wide, and flattened oval in section. The female emblem of this pair is a straight stick of sandstone, about the same size as the fish Moora female emblem.

Four other Mooras, brought to me about 15 years ago, were long cylindro-conical stones, nineteen inches long by one and a half inches in diameter. They were the emblems of the Circumcision Moora, who lived at Kalamurrinna. There was no female element with this Moora; the four similar stones represented the principal and his three helpers.

[Mr. Aiston has a very wide knowledge of the customs and manners and legends of the Wonkonguru and other tribes. He has lived in Central and Northern South Australia for many years; more recently at Mulka, via Marree. Formerly he was a member of the Mounted Police Force of South Australia. In collaboration with the late Dr. G. Horne he wrote a notable book, "Savage Life in Central Australia." Moora stones, collected by Mr. Aiston, are now in Mr. W. H. Gill's collection, and are the only specimens of the kind known. — Editor.]

EXCURSION TO BOTANIC GARDENS.

This excursion, which was for the purpose of relating and learning some of the incidental history pertaining to the eastern portion of the Botanical Gardens, took place on March 23. The party met at the office gate. Plans of the present design of the gardens, kindly supplied by the director, Mr. Rea, were handed to each member. When journeying to the east side of the gardens, opportunity was given for a hurried visit to the begonia conservatory, where a splendid display of these plants, at their best, was seen.

Many sites and localities of interest were visited, and important events and incidents connected with the gardens, since their establishment in 1845, were fully commented upon. Some of these were:—The former South Yarra entrance and corn paddock, then adjacent; the geographical and botanical groupings of plants by the late W. R. Guilfoyle; the reservoir structure at the highest point of the gardens and the various water supply schemes in vogue during the past 40 years; the rotunda, where the band of the 40th Regiment of British Soldiers played regularly, and where occasionally, moonlight concerts were held; the site where two Russian guns, taken by British Forces in the Crimean War, in 1854, were for many years located; the site where the Victorian (now Royal) Horticultural Society Shows were formerly held in marquees; the area which formed the original five acres, fenced off for a Botanical Gardens in 1846, and which included the well-known "Separation tree"; the area where an island of two acres of Tea-tree originally existed, at the east end of the present lake; and the three different bridges over the Yarra, which have formed the approach to the gardens from East Melbourne and Richmond, from 1867 to the present time.

We finished our tour with a walk to the Lotus-leaf Lake, and a talk about this plant, and then separated. The party, which numbered 40, seemed to have been pleased with the outing. The weather was fine.

M. PITCHER.

NATIVE FISHES SUITABLE FOR SMALL
AQUARIA.

By F. LEWIS, Chief Inspector of Fisheries and Game

There is a great variety of miniature fishes in Victoria, many of which are suitable for small aquaria. There is a big, untouched field here, however, for experiment and investigation, because so little is definitely known of the life histories of these little fishes.

For instance, take the species, *Galaxias attenuatus*, common in many of our southern streams, which seems to grow to its maximum in the Hopkins, and which is there known by its native name of *Turket*; both Waite and McCulloch say that it goes to the salt or brackish water to breed. Yet specimens of small fishes from Lake Bullen Merri, near Camperdown, have been identified as *Galaxias attenuatus*. This lake has no connection with the sea, but its water is highly mineralised, although Rainbow trout, a fresh water species, will live and thrive there.

It is remarkable, also, that while *G. attenuatus*, in the Hopkins, grows normally to 6 inches or 7 inches in length; in Lake Bullen Merri it never exceeds 2 inches. A few thousand specimens from the Lake have been transferred to Lake Catani, at Mount Buffalo, with a view to providing food for trout there, and in the hope of increasing the average size of the fish, which has been decreasing of late years, apparently because they have overtaken their food supply.

The important, point, however, regarding the little fishes is this, that while they are said to be very suitable for a small aquarium, if they require salt water for breeding, they possibly could not be bred in captivity. This is a point for experiment and elucidation by keepers of small aquaria.

Then there is Pigmy Perch, *Nannoperca Australis*. This fish, which is a typical little perch, is found most frequently in swamps and lagoons. It is very hardy, and is claimed to be a good aquarium fish.

The Flat-headed Gudgeon, *Phlypnodon grandiceps*, is another very hardy variety of our miniature fishes. It is found in many of our streams. Specimens exhibited at the Club's aquarium evening came from the Woody Yallock Creek at Cressy. It is not so lively in the aquarium as are some of the others, and seems to prefer to lie motionless at the bottom.

There are, besides the above, several varieties of small fishes, which I have had identified, from the Goulburn and Murray River systems, regarding which practically nothing is known. They are all extremely abundant, and no doubt form no small portion of the food of the better known sporting and commercial fishes.

Besides these native fishes, the Common Carp and English Perch, are, unfortunately, extremely abundant in most of our waters, and if a collection is made from a lagoon or back-water, it is almost certain to include many specimens of these undesirables.

BANDICOOTS AT BLACK ROCK.

Eastward of Sandringham and Black Rock, and southward towards Beaumaris, a considerable area of scrub-owned land, the "Sandringham Flora" of botanists, still remains unspoiled by builders and speculators, and provides a pleasant and safe retreat for some, at least, of its original wild denizens.

Insects, birds, small animals, lizards, snakes, etc. abound to an extent not realized by the casual observer, owing to the dense covert of *Leptospermum*, *Banksia*, and other shrubs. The presence of the Bandicoot in this area is probably well known to field naturalists, but I have not seen any record of the fact in our journal during the past thirty years, hence this note.

Occasionally, while collecting insects, I have "flushed" a Bandicoot almost at my feet, but in the brief view obtained was unable to determine the species. In one case the animal had formed a neat tunnel, a yard in length, in the tangled undergrowth, at the end of which was a nest about a foot in diameter, composed of grass.

J. C. GOULD.

SOCIAL SAW-FLY LARVAE.

Walking along the bank of the Goulburn River recently, I came upon a body of larvae of the Gumn Saw-fly, *Perga dorsalis* Leach. They were in column formation, about a couple of inches wide and a foot or two in length. The leaders were side by side with their hinder ends overlapping, and in contact with those immediately behind, and so on throughout the column. The column was stationary when I first saw it, and continued so. On being scattered, the grubs became intermittently active in their characteristic manner of raising and lowering their posterior extremities, tapping the ground on the downward stroke, and at the same time, making spasmodic forward movements. Returning about half-an-hour later, I found the column reformed. I noticed as I approached, that my steps seemed an incentive for a simultaneous tapping along the column, and a united forward movement of an inch or two. I tapped the ground with my fingers a few inches ahead of the column, which immediately responded by a concerted tapping along its length and another forward motion of an inch or two. Several repetitions of the test had a like result.

This observation is interesting, as indicating that these social grubs can communicate with one another, and that the communication takes the form, visible to us only in its crudeness, of that which in the abstract we term oscillation.

J. A. ROSS.

NEWTS IN CAPTIVITY.

If a few essentials are supplied, newts are very easy to keep in captivity, but if any of these details are neglected, the animals fail to thrive, and ultimately die.

The first essential is a proper receptacle; glass bowls are not at all suitable, either for newts or fishes. An oblong or square aquarium will do, providing that part of it is shaded so as to prevent a glare of light. Too much side light in an aquarium is always a mistake, and some aquatic plants, such as *Vallisneria spiralis*, will not live under such conditions; all species will suffer, more or less. The second essential is a good supply of water-plants. Personally, I favor, for newts, the common Canadian water weed, *Elodea canadensis*. This plant is very hardy and a rapid grower. Another advantage of *Elodea* is that none of my water snails appear to touch it, although these snails have completely eaten out and killed some of my other water-plants.

A wooden tub or a small cement pond afford the ideal conditions; but whatever vessel is used, steps must be taken to prevent the inmates from escaping. If newts are kept in an aquarium, it should be covered with glass, resting on thin pieces of wood, or covered with perforated zinc, otherwise the newts will climb out and be lost. For ponds, a small fence of plate galvanised iron, a few inches high, the top being turned over and inwards, will effectually prevent newts from wandering—they have a great inclination for roaming in wet weather, especially if kept short of food. This irresistible urge to wander is a wise provision of nature for the dispersal of the species; otherwise, they would overtake their food supply in the water in which they were living, while, possibly, water in the vicinity would be untenanted by them.

Newts can travel with safety only during wet weather, and if the favorable conditions continue for a few days, they may travel fairly long distances, and discover other water suitable to them. Newts seek shelter during the daytime, unless it is raining; otherwise they rest during the day and continue their wanderings as soon as it becomes dark. If the weather becomes hot, and travelling newts have failed to find suitable shelter, they will die; but some will be more fortunate and find water.

Some adult Japanese Newts, *Molge pyrrhospaster*, received from Japan, have been in my possession for over 15 years. Spanish Newts, *Molge waltli* are remarkable for the bony tubercles along the side of the body in adult specimens; this is caused by the ends of their ribs projecting; in old specimens this becomes very pronounced. This spring I reared three young ones, until they were just about to lose their gills, and I have seen no sign of them since, and am of the opinion that a small terrapin knows something about their disappearance! The males of this species, unlike those of most others, does not display grand colors during the breeding season; yet it is very prettily marked, and marbled in color similar to the fine blackfish of Currier's River, in the Western District.

A small terrapin, *Chelonia longicollis*, was dragged, together with some aqunties, out of a lagoon at Mildura last June, at which time it was hibernating. It measured exactly one and five-eighths inches in length; in the course of a few months it more than doubled its size. This is a great gain, especially when it was

hibernating when found, and for a long time afterwards at my place. It has again (April) gone into its winter quarters, having buried itself in a pot of aquatics. This is a puzzling thing, how a lung-breathing animal can remain under water for months at a time.

H. W. DAVEY.

SOUTH AUSTRALIAN HANDBOOKS.

Another volume of a notable series of handbooks of the Flora and Fauna of South Australia, has been issued, and it ranks with the best of its predecessors. But all of those so far published are excellent and of value for use in neighbouring States, as well as South Australia. In fact, every Australian field naturalist should find the volumes both interesting and helpful.

The handbooks are issued by the British Science Guild (South Australian Branch), and published by favour of the Premier. They are not at all costly; as commercial ventures, probably they would be sold at much higher prices. The latest volume, consisting of 270 pages, printed on good paper, and finely illustrated, costs seven shillings and sixpence. Some of the volumes are only four shillings, others five shillings each. The Guild and the Government must be commended for their service to students and lovers of wild nature. Other States might follow the example!

From 1922 to 1927, the handbooks were edited by the late Mr. Edgar R. Waite, F.L.S., C.M.Z.S., who is also the author of the latest addition to the series, and an earlier volume on fishes. Since Mr. Waite's death, last year, Mr. Herbert M. Hale, curator, South Australian Museum, has been editor of the handbooks. When he died, Mr. Waite had almost completed the M.S. of the present volumes, "The Reptiles and Amphibians of South Australia." In accordance with the author's wish, Mr. Hale collated his notes, and, in general, prepared the M.S. for publication.

We have long needed a scientifically accurate but popular guide to our reptiles and frogs, and this volume supplies it in large measure. Many of the species dealt with, of course, occur beyond the boundaries of one State; some are wide-ranging and among the commonest of snakes and lizards. Victorians will have nearly as much use for the book as the naturalists of South Australia.

Mr. Waite was a scholarly man, as well as a scientist of distinction, a leader in his own special field, and he wrote this book, surely not as a task, but with pleasure. It is admirable; a model for zoologists, who wish to give their knowledge to the many rather than to the few. The illustrations—nearly 200—are worthy of the text; they include diagrams, figures from standard works, original drawings and photographs direct from nature.

Those who were privileged to know the late Mr. Edgar Waite reading this book, will find the man revealed in its pages; his kindly nature, his whimsical humour, his earnest desire to give freely of his knowledge, to help the novice, and foster a love of wild nature. It is a book that one may praise unreservedly, feeling keen regret that its author is no longer living. C.B.

EASTER EXCURSION TO WARBURTON.

A party of nine attended the excursion to Warburton during the Easter holidays. The weather on Good Friday was dull, and the afternoon was spent in walking along the river banks in the precincts of the township. On Saturday morning, a trip was made to Cement Creek. It was a day of brilliant sunshine, and, as our car sped round the ever-ascending curves, beautiful vistas of the Yarra valley far below alternated with shady avenues of gully vegetation and giant tree-ferns, while all the way towered the straight boles of the great Mountain-ashes (*Eucalyptus regnans*).

At Cement Creek, a strong flow of clear, cold water poured over and around moss-grown granite boulders in the shade of a fine grove of old Myrtle-beeches, with an occasional pungent-scented Southern Sassafras. Giant Mountain-grass, with fruiting stems up to 8 feet high, grew freely along the road cutting, amid the shapely, straight-stemmed Elderberry *Panax*. Moss and young ferns clothed the up-hill sides of the cutting, and where a small stream crossed the road some plants of the Ray Water-fern (*Blechnum fluviatile*) were noted.

In the afternoon a pleasant walk was taken to the site of Old Warburton (now no more), via Scotchman's and Backstairs Creeks. Passing the fish hatchery and "Old Joe's" picturesque hut, a sidling track was taken beneath beautiful white-stemmed eucalypts and big blackwood trees, and shady gullies full of Blanket-leaf, Hazel Pomaderris, Christmas Bush (*Prostanthera*) and feathery tree-ferns. From the top of the track the old coach road, high up on the slopes of the southern range, was followed, affording charming views of the Yarra Valley, backed by the majestic Yungla Range.

Other easy walks extended from near Millgrove, on the west, to Sunnydale, on the east. We noted the dense groves of Kunzea, Silver Wattles and Lightwoods, over which clambered the Wonga Vine and Clematis. Some of the sprays of the Kunzeas were weighted down with clusters of small black flies, like swarms of tiny bees, which, when disturbed, filled the air, to our discomfort.

On Easter Monday we visited La La Falls, at the head of a gully of the creek of the same name. This gully was burned out a few years ago, but a vigorous new growth of characteristic vegetation was asserting itself. Along the track, the Hop *Goodenia* was particularly dense, and some plants of the White Elderberry and Tough Rice-flower were noticed. The numerous tree-ferns had survived the fire, and were restored, but the only group of Myrtle-beeches in this gully had suffered severely, although some were still alive. Specimens of the Beard-moss, hanging from the branches of the trees, and Plume-mosses, on the damp stones, were taken.

We did not see any animals on this excursion, and night expeditions to the river with electric torches failed to reveal any Platypi. On two evenings the weird screams of the larger Flying Phalanger were heard in the big trees bordering the river. About 25 species of birds were noted, among them being the Wedge-tail Eagle, Black and Gang Gang Cockatoos, Pied Strepers, Collared Sparrowhawk, Coach-whip Bird, Collared Butcher Bird, Eastern Spinebill and Rose-breasted Robin.

A. E. RODDA.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the club was held in the Royal Society's Hall, Victoria Street, Melbourne, on Monday, May 13, 1929. The President, Mr. F. E. Wilson, F.E.S., occupied the chair, and there were about 90 members and visitors present.

VISITORS.

The President welcomed Mr. Cope, of the Philadelphia Academy of Science, who is interested in entomology. Mr. Cope briefly responded, thanking the President and members for their hearty welcome. He said that a meeting conducted like that of the Field Naturalists' Club of Victoria was unique in his experience, and could be copied with advantage elsewhere. Mr. A. D. Selby, a country member, was also welcomed, and congratulated on his exhibit of photographs of native birds.

CORRESPONDENCE.

From the Minister for Forests, acknowledging a letter from the Club regarding the destruction of ferns in the Warburton and Kinglake districts, and promising to post more prohibitive notices as suggested by the Club; also thanking those members who had interested themselves in the preservation of our native flora.

From the Council for Scientific and Industrial Research, regarding uniform vernacular names for Australian plants throughout the Commonwealth, acknowledging receipt of a copy of the Census of Victorian Plants, and thanking the club for its offer of co-operation in the matter.

REPORTS.

Reports of excursions were given as follow:—Mt. William aboriginal quarries, Mr. A. S. Kenyon; St. Kilda Gardens, tree planting, Mr. V. H. Miller; Deep Creek, Mitcham, Mr. F. Chapman, A.L.S.; Kinglake, Mr. A. E. Keep.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As country members: Mr. J. M. Rush, Yabba North, and Miss E. Barton, Paynesville. As ordinary members: Mr. G. W. Brown, Parliament House, Melbourne; Miss J. Ferguson, Sunshine; Mrs. B. H. G. Newell, Toorak; Mr. W. Richardson, Glenhuntly; Miss E. Pearce, Glenferrie, and Miss M. H. Crabb, Prahran.

ELECTION OF AUDITORS.

Messrs. J. Ingram and A. S. Blake were elected as Auditors for the year.

NOMINATION OF OFFICE-BEARERS, 1929-30.

Nominations were received as follows:—President, Mr. P. R. H. St. John (proposed by Mr. J. W. Audas, seconded by Mr. G. Coghill); Vice-Presidents, Mr. C. Barrett, C.M.Z.S. (Messrs. F. E. Wilson and A. E. Rodda); Rev. W. C. Tippet, F.L.S. (Messrs. F. E. Pescott and Mr. M. J. Woodhouse); Mr. G. Coghill (Miss G. Noakes and Mr. F. G. A. Barnard). Hon. Treasurer, Mr. W. H. Ingram (Messrs. A. E. Rodda and V. H. Miller). Hon. Librarian, Dr. C. S. Sutton (Messrs. H. B. Williamson and A. E. Rodda). Hon. Editor, Mr. C. Barrett, C.M.Z.S. (Messrs. E. E. Pescott and G. Coghill). Hon. Secretary, Mr. A. E. Rodda (Messrs. F. E. Wilson and T. Greaves). Hon. Assistant Secretary and Librarian, Mr. H. B. Williamson (Messrs. F. E. Wilson and W. H. Ingram). Committee, Miss J. W. Raff, M.Sc., F.E.S. (Miss M. C. Bage and Mr. G. Coghill); Mr. J. W. Audas, F.L.S. (Messrs. A. J. Tadgell and J. Wilcox); Mr. M. J. Woodhouse (Messrs. H. B. Williamson and A. E. Rodda), Mr. A. E. Keep (Messrs. L. L. Hodgson and C. A. Lambert), Mr. C. Daley, B.A., F.L.S. (Messrs. E. S. Hanks and L. J. Bailey), Mr. V. H. Miller (Messrs. H. B. Williamson and W. Ramm), Mr. C. Borch (Messrs. F. E. Pescott and C. Barrett), Mr. L. L. Hodgson (Miss J. W. Raff and F. E. Wilson), Mr. J. A. Kershaw (Messrs. D. Dickison and A. E. Rodda), Mr. D. Dickison (Messrs. A. H. Mattingley and A. E. Rodda).

LECTURE.

Mr. A. D. Hardy, F.L.S., delivered a lecture on "Sand Drifts in the Mallee," which was illustrated by lantern slides of the Mallee country, and also of the conditions prevailing in the sandy districts in Egypt and Turkestan. He instanced numerous cases where the removal of natural vegetation had resulted in the formation of menacing sand dunes and the denudation of surface soil by wind erosion.

EXHIBITS.

By Mr. A. E. Opperman:—Dendritic markings (very large) on stone from Black's Quarry, Lilydale.

By Mr. Jas. A. Kershaw, F.E.S., for National Museum:—Larvae of Swift moth (*Porina fuscumaculata*) attacked by the fungus *Cordyceps Gunmii* (vegetable caterpillar), collected at Thorpdale, Victoria, by Mr. E. R. Mann.

By Mr. H. J. Evans:—Aboriginal grinding stone found on the bank of the Kananook Creek, Seaford.

By Mr. A. Mattingley:—Aboriginal stone axe-head, from Bega, N.S.W.

By Miss G. E. Neighbour:—Five paintings of wild-flowers painted by the exhibitor—*Anigozanthos Munglesii*, *Dendrobium linguiforme*, *Diuris punctata*, *Caladenia dilatata*, *C. filamentosa*, *C. Patersoni*, *Calochilus paludosus*, *Diuris palchra*, and *Lyperanthus suaveolens*.

By Mr. P. R. H. St. John:—Herbarium specimen of *Eucalyptus pachyphylla*, F.V.M. (Yellow-flowered Mallee), collected near Tanami, Central Australia, by Mr. E. Officer, Mr. M. Terry's expedition, July, 1928.

By Mr. Thos. Kerr:—Specimen of *Convolvulus* Hawk-moth and flowering specimens of *Tecoma australis*, var. *Latrobei* and *Sida corrugata* (tall form), collected by exhibitor at Griffiths, N.S.W.

By Mr. C. J. Gabriel:—Five species of *Tridacna* (Clam Shells), mostly Australian—*Tridacna crocea*, Lam; Queensland; *T. derasa* Bolten, Torres Strait; *T. elongata* Lam, Lord Howe Island; *T. squamosa* Lam., Torres Strait; *T. maxima*, var. *fossor* Hedley, Lord Howe Island.

By Mr. V. H. Miller:—Specimen of *Banksia prionotes* from Western Australia.

By Mr. A. M. Wade, to illustrate note in the May *Naturalist*:—(a) Photograph of parasitized larva of Emperor Gum Moth, with healthy larvae alongside for comparison; (b) adult Braconid Wasp; (c) nine hundred and thirty-eight (938) Braconid cocoons, removed from the silky material covering the above larva.

By Mr. E. E. Pescott, F.L.S.:—Photograph of aboriginal rock painting and shelter at Mount Mistake, by Rev. C. Lang, Ararat; (b) red ochre grinding or pounding stone used for powdering ochre to be used in rock painting, north-west New South Wales; (c) specimen of *Thryptomene calycina* (*T. Mitchelliana*), cultivated.

By Mr. A. J. Tadgell:—Botanical specimens—(a) Small grass-tree *Xanthorrhoea minor*, showing abnormal flowers; (b) Coast Salt-bush, *Atriplex cinereum* (male flowers), showing pollen later than usual; (c) Common Correa, *Correa rubra*, var. *virens*, showing abnormal stamens, apparently in a transition stage towards double flowers; (d) Fat Hen, *Chenopodium album*, including a large leaved form, showing a bright red colour on the young leaves, the result of the disease (*Haemorrhagia*), in which the sap exudes through wounds made by insects.

NOTES ON CERTAIN SPECIES OF *THELYMITRA*

By W. H. NICHOLS.

For some years now, it has been apparent to the writer, and to some other observers, that we have in Victoria and other States an old-described *Thelymitra* species, the name of which has never been included, so far as can be at present ascertained, in any census of Victorian plants. Yet *Thelymitra media*, R. Br. (fig. 1) is found growing abundantly in numerous localities.

Judging by various notes which have occasionally appeared in *The Victorian Naturalist*, this plant has been mistaken by some observers for *T. aristata*, Lindl., a species with fewer flowers (fig. 6). Others have followed Bentham, the author of *Flora Australiensis*, who considered *T. media* to be merely a variety of *T. canaliculata*, R. Br. Robert Brown knew better! He was an extremely careful botanist, and Darwin said of him: "He seemed to me to be chiefly remarkable for the minuteness of his observations, and their perfect accuracy." (a).

The mere fact that it is now proved that *T. canaliculata* does not occur in the eastern States, as stated by Lindley, Bentham, Fitzgerald and others (see notes on *T. canaliculata*) proves also that *T. media* is deserving of full specific rank. *T. media* was first collected in 1801, and was described by Robert Brown in his *Prodromus*, 1810. In *Australian Orchids* (Vol. 1), Fitzgerald illustrates an orchid under this name. He says: "Having no access to Brown's species, it is with hesitation that I have given the name of *media* to this plant, but it is, at least, not inconsistent with the short description given by him, and is, I think, the species he obtained near Sydney."

Fitzgerald's interpretation, in my opinion, is a correct one; his figures agree in all essential particulars with Robert Brown's description, and our Victorian forms likewise agree.

Robert Brown's specimens were collected at Pt. Jackson, N. S. W. Fitzgerald's illustration is taken from a somewhat small type of plant; still, we are on safe ground when we assume it to be a correct definition of this beautiful orchid.

It is chiefly to the column that we look when we seek the identity of a number of these blue-flowered sun-orchids, outstanding variability here is of paramount importance. In *T. media*, the column has a prominent—usually blue—marking lying across, just below, the upper margin of the hood.

The Victorian representatives, at least, vary considerably, but the differences between individuals are mainly a matter

of physique and of color. Some of the plants are exceedingly robust, others very slender; a white-flowered specimen is on record (Silvan, Oct., 1929, W.H.N.). The markings on the column, though usually blue, are sometimes brown or green, even pink markings have been noted. These variations must be expected, and they are occasioned, possibly, chiefly by the conditions of environment.

In the Dandenong hills, at Gembrook, Silvan, etc., this plant is exceedingly numerous during September and October. It occurs chiefly on the lower levels, in somewhat dense forest, where the potato-orchid (*Gastrodia sesamoides*, R. Br.) is likewise abundant. In such places, *T. media* reaches to a height of over three feet. The flowers are large and often very numerous; usually deep blue, with purple markings, the latter color predominating on almost every part of the plant. The leaf is long, narrow, and deeply channelled. On the other hand, *T. media* is often found solitary. It grows in almost any kind of soil, and in practically any situation. Little wonder that it varies so greatly!

While wandering over the country close to Mt. Evelyn in August, in a storm-swept valley, I found some debris, growing in which was a *Thelymitra*. This bloomed two months later in my bush-house, producing a splendid spike of 26 large, delicate blue flowers, with light green markings. It was fragrant (fig. 2). The leaf was wide, very thick, "leathery," with the surface rugose. Similar specimens have been collected near Postman's Creek, Warburton (A. B. Braine), and typical plants have been observed around Healesville, Stawell, Kinglake, Riddell, Bayswater, Wonga Park, Monbulk, Launching Place, and other Victorian localities too numerous to mention here.

Mr. Edwin Cheel, curator of the National Herbarium, Sydney, writes (in answer to my enquiries): "We have here specimens of *T. media*, R. Br., from Hawkesbury River (and two other N.S.W. localities), also from Kilmore, Victoria." Dr. R. S. Rogers refers to *T. media* in a letter of recent date as "a very common orchid, which I have received from many localities."

T. media is mentioned by Bentham (*Flora Australiensis*, Vol. VI., p. 318) as a possible variety of *T. canaliculata*, R. Br., but a survey of their respective differences, etc. (in the column, chiefly) shows clearly that here we have two distinct species. Distribution (so far ascertained):—Victoria; New South Wales, Western Australia (under *T. canaliculata*—Fitzgerald). (b).

T. canaliculata, R. Br. (fig. 3).—The original description of this species also appears in the *Prodromus*. In the light of

recent experience with this orchid, Fitzgerald's interpretation, in this instance, is incorrect. His figure of the plant, which, strangely enough, is incomplete, is representative of what I consider to be a form of *media*. An identical specimen is preserved in the National Herbarium, Melbourne (this is remarked upon further on). Some have even considered this plate as referable to a variety of *T. izioides*, Swartz! which is probably our most variable sun-orchid (see figs. 10, 11, 12).

Fitzgerald's figure (under *T. canaliculata*) certainly has a general resemblance to Swartz's species, but the absence of the dorsal crest, and other equally important features, are sufficient, in my opinion, to justify separation.

Fitzgerald himself wrote: "It is with doubt I have given this plant the name of the species represented, but it is the only one I have found to agree with the description by Brown. I therefore think it had better be taken as *canaliculata*, than give that name to one, the characters of which could not be reconciled with the description." Fitzgerald's specimen (as illustrated) was obtained at Hunter's Hill, near Sydney (Sept.). He also obtained a few specimens at Albany, W.A.

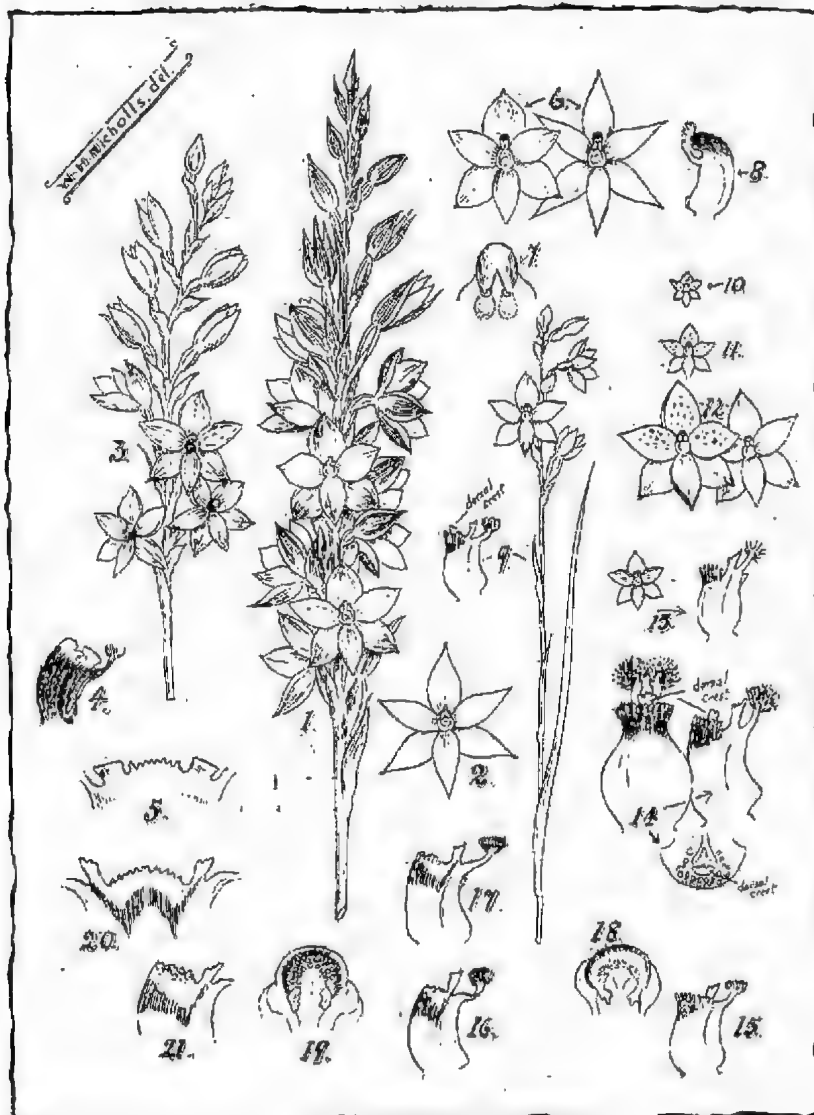
Botanists generally appear to have recognised the form figured by Fitzgerald as distinct from *T. izioides*, but seem, on the other hand, to have accepted this plate as representing Robert Brown's *T. canaliculata*.

But the original drawings, in the British Museum, show a different form of column. The habit of *T. canaliculata* is variable, as in so many other members of this genus; but, usually, the normal specimens are about the stature of a medium-sized plant of *T. media*.

I have carefully examined a perfectly-preserved specimen of *T. canaliculata*, R. Br., from Dumblebung, Western Australia (Nov.), forwarded by Colonel B. T. Goadby (fig. 3), also a flower from another undoubted *T. canaliculata*, R. Br., sent by Dr. Rogers. The inspection of these specimens (which were identical) showed a column differing in a considerable degree from the columns of eastern specimens placed under this name (fig. 4).

Two specimens received from the National Herbarium, Melbourne, have also been very carefully examined. One comes from North Devon, near Yarram (Audas), and the other from Kinglake (Tadgell)—both Victorian localities. The former specimen is identical with Fitzgerald's illustration under *T. canaliculata*. The latter specimen (labelled "var. *media*") is without doubt a typical *T. media*, R. Br.

Mr. Cheel also informs me that there are no eastern specimens under *T. canaliculata* in their collection.



Thelymitra Species.

For a Western Australian specimen, collected by Mr. A. G. Hamilton in 1902, "no specific locality is given, or even the month of collecting." Mr. Cheel also says, "I doubt very much if the Hunter's Hill (Fitzgerald's locality) plants of *T. canaliculata* (following Fitzgerald) are in any way different from those of *T. media*, R. Br."

Carefully pressed specimens (labelled "*T. canaliculata*, R. Br.") received from Paterson, N.S.W. (Rev. H. M. R. Rupp) were also inspected. This type is, I think, referable to *T. lilacina*, F.v.M. (c), which is referred by Lindl in *Linnaea*, xxvi., 242, to *T. canaliculata* (b). It is a very small (comparatively) slender form, bearing but few flowers—usually one to four (fig. 9). It has been collected in Victoria also by the writer at Bayswater (Oct.), and on French Island (Nov.).

The collector (Mrs. E. M. Eaves) reports it is numerous. It is, doubtless, a form of *T. izioides*, Swartz. The flowers of all the specimens I have examined are without spots, but Mrs. Eaves is positive that many of the specimens observed on French Island had the flowers spotted, as in the typical *T. izioides*. However, this feature is of little consequence, as spots have been noted in the flowers of *T. luteo-ciliata*, Fitzg., Wonga Park (F. G. A. Barnard) and at Yarra Junction (Mrs. E. M. Eaves); also in *T. carnea*, R. Br., Bayswater (H. B. Williamson)—all in October. The above instances are quite exceptional.

The columns from the Western Australian flowers of *T. canaliculata* (previously referred to) certainly agree with the column depicted in a coloured copy (lent by Dr. Rogers) of Ferdinand Bauer's original drawing in the British Museum. Bauer accompanied Robert Brown in the Investigator as draughtsman and artist to the expedition. "These drawings bear the same date and locality as Brown's specimens, to which also Brown refers in his MSS. descriptions" (so runs an accompanying note). Robert Brown's type was collected at King George's Sound, in Western Australia, in which locality he spent three weeks, December, 1801 (d).

The flowers of *T. canaliculata* are bluish-purple, or blue, with darker blue longitudinal veins, and the column has a very rich purple hue, the intermediate lobes are golden, the extreme margins ("teeth") whitish.

So it seems that, according to the foregoing evidence, we have, in this instance, another case of incorrect determination, arising from a somewhat close resemblance of two plants to each other, but yet having, each of them, when critically examined, characters which make them readily recognisable as separate species.

Finally, it is interesting to record that there is not an instance on record (to my knowledge) of a rare, or comparatively rare, orchid (such as *T. canaliculata*, R. Br.) finding its way across from the State of discovery to the extreme eastern or western limits of this Continent. (Feb. 17, 1929.).

- (a) The life and letters of Charles Darwin.
- (b) Bentham, in *Flora Australiensis*, Vol. VI., p. 318.
- (c) *T. lilacina*, F.v.M.—For the description of this plant, I am indebted to the National Herbarium, Melbourne.
- (d) See note in the Biography of Robert Brown, Aust. Orch., by Dr. R. S. Rogers, p. 43).

KEY TO PLATE.

Thelymitra Species.

Fig. 1.—*Thelymitra media*, R. Br., Silvan, Ocl.; flowers blue, with purple markings.

Fig. 2.—Flower from Mt. Evelyn specimen, pale blue, with green markings.

Fig. 3.—*T. canaliculata*, R. Br., from herbarium specimen lent by Col. Goadby (W.A.).

Fig. 4.—Column, side view, *T. canaliculata*.

Fig. 5.—Formation of lobes, *T. canaliculata*; penicillate lobes missing.

Fig. 6.—*T. aristata*, Lindl; flower types.

Fig. 7.—*T. aristata*, Lindl; head of column from above.

Fig. 8.—*T. aristata*, Lindl; column from side, from a flower (forwarded by Dr. Rogers), from W. H. Archer's collection, quoted by Lindl (Tasmania).

Fig. 9.—Small form of *T. ixiooides*, Swartz (*T. lilacina*, F.v.M.).

Fig. 10.—*T. ixiooides*; flower whitish; $\frac{1}{4}$ in. in dia. (Bayswater).

Fig. 11.—*T. ixiooides*; flower dark blue; $\frac{3}{4}$ in. in dia. (Airey's Inlet).

Fig. 12.—*T. ixiooides*; typical flowers.

Fig. 13.—Flower and column of *Thelymitra* (Whittlesea and Airey's Inlet); flower $\frac{3}{4}$ in. in dia.; lavender, spotted in a regular manner; at present included under *T. media*, R. Br.

Fig. 14.—*T. ixiooides*, Swartz; column from rear, side and above.

Fig. 15.—*T. canaliculata*, after Fitzgerald.

Figs. 16 to 21.—*T. media*; types of columns, from various aspects.

ECOLOGY OF MARYSVILLE AND LAKE MOUNTAIN.

By P. F. MORRIS.

(National Herbarium, Melbourne.)

From a geobotanical point of view, little or nothing has been done to group the flora of various districts or associations in Victoria, in order to give an instructive picture of the sociological structure of our plant covering and its relation to the habitat. I propose to give, as far as my knowledge permits, some idea of the plant associations of the Marysville-Lake Mountain districts, especially Echo Flat.

MARYSVILLE AND ITS VICINITY.

The hilly and mountainous country is, in its vegetation, a typical example of most of the hill country around the Dandenong Range area. The principal associations are not very well preserved, and have been influenced by human activity.

The "Talbot Drive," of about eight miles, follows the Taggerty River to within a short distance of Keppel Falls. On the left the country is flat and alluvial, on the right the ground rises, and is clothed with a vegetation different from that of the flats. The Valley Beautiful and the Forest of Arden, with the Myrtle Beech, *Nothofagus Cunninghamii*, growing in pure association, are charming areas. Further on, the forest is mixed with Eucalyptus, as a top-covering to the smaller, woody shrubs, which protect the herbs. In the more open forests, grasses and sedges occur.

Eucalypt covering; *Eucalyptus viminalis* (Manna Gum) inhabits the moist alluvial flats along the river; *E. ovata* (Swamp Gum) and *E. rubida* sometimes grow in mixed association with it, but they generally persist on slightly higher, and perhaps better, drained and sweeter, soils. These species give rise to *E. gomicalyx* (Mountain Grey Gum), known locally as Blue Gum, interspersed with an occasional Mountain Ash (*E. regnans*) and Messmate (*E. obliqua*). The two latter species may have once been the principal trees of the area, but the area was cut over many years ago, thus the better timber trees would be used.

Acacia Association.

A corresponding difference of association and distribution is found in the three species of *Acacia*:—*A. dealbata* (Silver Wattle), *A. mollissima* (Black Wattle), and *A. melanoxylon* (Blackwood). *A. dealbata* follows the rivers and alluvial soils; and is found growing with *Eucalyptus viminalis*; *A. mollissima* is distributed similarly to *E. rubida*, while

A. melanoxylon follows the lines of *E. ovata*, *E. gonicalyx* and *E. obliqua*.

Shrubs Association.

The principal shrubs which grow below the canopy of *Eucalyptus* and *Acacia* are *Leptospermum lanigerum* (Woolly Tea Tree), *Olearia lyrata* (Snow Daisy-bush), *Lomatia ilicifolia* and *L. longifolia*, *Zieria Smithii* (Sandfly Zieria), Native Mulberry, Banyalla, Golden Goodia, Prickly Coprosma, Blanket-leaf, shrubby species of *Acacia*—*A. verticillata* (Prickly Moses), *A. verniciflua*, *A. juniperina*, and *A. oxycodrus* (Spike *Acacia*).

Herbs and ferns consisted of *Polystichum aculeatum* (Prickly Shield Fern), *Blechnum capense* (Soft Water Fern), *Blechnum discolor* (Fishbone Fern), *Histiopteris incisa* (Batwing Fern), *Pteridium aquilinum* (Bracken Fern) and *Alsophila australis*—often clothed with layers of *Hymenophyllum* (Filmy Ferns). Included among the herbs were species of *Triglochin*, *Ranunculus*, *Mentha*, *Stylidium graminifolium* (Grass Trigger Plant), and here *Poa caespitosa* (Tussock Grass) grows in dense communities.

All along the road, *Nothofagus Cunninghami* was, to be seen growing in pure associations on the banks of the rivers. In places, these trees are very abundant, and provide a distinctive contrast to the Eucalypts, with which they are surrounded. The difference in relation to plant life between the amount and density of light is most strikingly apparent under the dense crown of leaves of the Myrtle-Beech; the ability of undergrowth to live is diminished.

Leaving Marysville, a walk of eight miles along the Wood's Point Road leads to the turn-off to Mount Arnold and Snowy Mount. The vegetation here has altered considerably, on account of the altitude. The slopes are fern-clad, the trees are large but few, and represent the remnants of a fine forest of Mountain Ash. Passing over Mount Arnold to Snowy Mount, large areas of dead trees were noticed; the result of fire, probably started to make room for grass for a few mountain cattle. The question of grazing leases in or near timber areas is one worthy of our Club's consideration. Here, trees to a height of 200 feet or more, with their charred and weathered surfaces, stood as monuments to the destruction that can be caused by fire. Ascending Snowy Mount, the first Snow Gum association was reached at 4000 feet. This species forms almost impenetrable thickets and makes a canopy for several plants that appear on the lowlands as fairly large shrubs, but here are weak and straggling. Lake Mountain lies north-east, and is reached after a climb over

granite boulders and through thickets of Snow Gum. The reading at the highest point of the mountain was estimated as 4890 feet.

Geologically, Lake Mountain consists of large rocky outcrops of granite. As yet, no detailed geological map of the area has been published. Even a superficial observation of the area is sufficient to show that many interesting correlations of the plant communities could be made, were more geological data available.

No previous work has been published on this area. Owing to the absence of a properly equipped field laboratory, the scope of investigations regarding climatic conditions is somewhat limited. Snow often lies on the ground from May to October, while heavy falls of snow in November are not rare. No regular record of rainfall has been made, but the data taken at a point corresponding in height, and five miles north-west of the mount, shows the average rainfall to be 37 inches.

The flora of Lake Mountain may be divided into three main divisions—(1) Basal Slopes, (2) Hillside Flora, (3) Echo Flat, or "Soak Flora."

Basal Slopes.

An analysis of the flora of the basal slopes does not provide anything of great interest. The soil is a black light peat, composed of a considerable amount of decaying vegetable material. Owing to soakage from upper levels and heavy falls of snow, much of the area is boggy, and sometimes swampy, ground. After the snow melts, these areas gradually dry as the summer months approach. A large amount of water is retained. The small herbs, such as *Brachycome alpina*, *B. Tadjellii*, *Caladenia alpina*, *Drosera*, and other plants appear as the water recedes.

Trees are absent from these soaks, their places being taken by herbs, sedges, mosses, hepatics, etc. Around the edges of the soaks grow *Cladium Gunnii*, *Carex brevicaulis*, *Luzula campestris*, *Crassula Sieberiana*, *Blechnum fluviatile*, *Blenodia alpestris*, *Calamagrostis filiformis*, *Danthonia pencilata*, *Gnaphalium japonicum* and *G. alpigenum*, *Cotula alpina* and *Claytonia australasica*. Most of these areas are surrounded by a thick growth of *Leptospermum scoparium* and *L. lanigerum*.

Hillside Flora, 4000 Feet.

Owing to protection from wind, most of the hillsides are well clothed with trees and undergrowth. The trees forming the lower division, which graduates to the upper division,



Echo Flat, Looking South West.



Summit of Lake Mountain, Looking South.

consist mainly of *Atherospermum moschatum*, *Nothofagus Cunninghamii*, *Acacia melanoxylon*, *Acacia dealbata*, *Eucalyptus gigantea* and *E. regnans*. These trees descend to the lowest flats of the area, and are found in mixed company, and occasionally in pure association. Under shrubs are generally conspicuous, and almost form an impenetrable thicket. The forests are open, and apparently have been invaded by the undershrubs. The chief plants in this section are:—*Bursaria spinosa* (Sweet Bursaria), *Hedycarya angustifolia* (Austral Mulberry), *Pomaderris apetala*, *Bedfordia salicina* (Blanket-leaf), *Prostanthera lasiantha* (Christmas Bush), and *Caprosma Billardieri*.

The summit of Lake Mountain is bare of vegetation, except for a few straggling Snow Gums and a few patches of *Poa caespitosa*, which grows in rock crevices. To the north-east of the summit lies Echo Flat; it is here that most of the flora of Lake Mountain grows. Five days were spent in exploring the flat and its flora.

HIGH SWAMP FLORA.

Echo Flat.

Topography.—From a point of view of topography, Lake Mountain does not present any features of special interest. The mount and the country surrounding appears to be portion of a dome-shaped granitic intrusion, and the features presented are just the same as those noted on almost any granite area. The water soakages, however, are more extensive than is usually the case, and occur in an almost horizontal plane, tilting slightly to the south. The soakage area is known as Echo Flat, and lies to the north of the mount.

The rock is only thinly covered with soil, and the soakage line is very sharply defined, both by the nature of the surface and by the vegetation. For some distance around Echo Flat the country is comparatively level, the higher points only rising gently from 50 feet to 200 feet. The physical features do not present any serious obstacles to one traversing the area, but the vegetation is a serious difficulty, forming almost impenetrable thickets. *Eucalyptus coriacea* is the only tree of these associations.

"Lake Mountain" is really a misnomer, and is said to have originated from rumours that were heard from time to time of large sheets of water there. Mr. Keppel, sen., informed me that these rumours were current fifty years ago, and the "lakes" were said by some to be very large, and by others to be small. There seems little doubt that the name originated

from these rumours, rather than from the presence of any real lakes.

There is no evidence whatever that a lake existed in the area at any time. The sharp line of demarcation caused by the water soakages does, at first glance, suggest a lake margin; and the presence of many pools of water in the lower portions adds to the impression. There are no lakes either on or near Lake Mountain, and, in my opinion, there never have been. The pools are similar to those found in most boggy areas, but are larger, and range from two to three feet deep to thirty to fifty feet in diameter.

The pools, almost without exception, are on a higher level than the stream draining the country; and they appear to be of a very temporary character. Several of the pools to the north of Echo Flat are within two feet of the stream and eighteen inches or more above it. The water is retained only by a small line or wall, bound together by *Sphagnum cymbifolium* (Sphagnum Moss), *Polytrichum juniperinum*, *Luzula campestris*, and other plants. A stroke with a spade would drain them; there is abundant evidence to show that, occasionally, these frail barriers break down, and that pools are drained from time to time. The blockage of the drainage ways by the growth of mosses, etc., which arrests the abundant decaying vegetable material, re-establish the barriers, and the pools re-form. The pools appear to be rapidly filling with peaty sludge, and it is highly probable that they would have long since disappeared if the retaining barriers had not broken down and allowed the accumulated material to be carried away by the stream.

Probably the most interesting feature is the regularity, and extent of the seepage line, and the abundant flow of water from it. The rainfall is about 37 inches, and snow often lies for six or more months, but taking into consideration the small amount of country higher than the seepage line and the shallow soil, it is an interesting speculation as to how the flow is sustained.

ECHO FLAT FLORA.

The effect of the extremely damp and cold habitat is evident when a comparison of the floristic composition of associations is made. The hilly and mountainous country is clothed in an abundant vegetation, including trees to a height of 200 feet or more. To a height of 4500 feet trees form the chief covering to all associations. Where the soil is extremely damp and cold; trees are not found, and Echo Flat is treeless except for dense bands of Snow Gum, which inhabit the outer and well-drained parts of the flat.

The relation of plants and plant associations to the edaphic factors of the habitat is very close, and has been found to conform to certain definite laws, that must not be ignored by the modern plant sociologist. Chemical-edaphic influences are an extremely penetrating, and often a decisive, agent for the distribution of plant communities and of individual species in every natural district of vegetation. The acid soil conditions of Echo Flat and its different flora is a direct answer to the question as to the confinement of plants to certain soils.

Before proceeding to more detailed explanations, I shall present a list of the plants of Echo Flat.

MUSCAE.

Stereodon cupressiforme, *Sphagnum cymbifolium*, *Bryum* species.

LICHENES.

Usnea barbata, *Parmelia conspersa*, and other species.

Lycopodiaceae.

Lycopodium clavatum, L. (Common Clubmoss).

MONOCOTYLEDONEAE.

Cyperaceae.

Carex appressa (Tall Sedge).

Juncaceae.

Luzula campestris, var. *australasica* (Field Wood-rush).
Juncus falcatus (Sickle Leaf-rush).

ORCHIDACEAE.

Caladenia alpina (Mountain Caladenia), found with one flower on Echo Flat, but in more congenial localities it has two to four flowers.

DIOTYLEDONAE.

Fagaceae.

Nothofagus Cunninghamii (Myrtle Beech). A tree growing to 100 feet or more on the deep-soiled lowlands; here it is a prostrate plant, adhering to the lee side of rocks.

Proteaceae.

Orites lancifolia (Alpine Orites).

Polygonaceae.

Rumex acetosella (Sorrel Weed). This common introduced weed is growing in abundance. It also grows in luxuriance on Cradle Mountain and Mount Wellington, Tasmania.

Caryophyllaceae.

Stellaria pugsens (Prickly Starwort).

Ranunculaceae.

Ranunculus hirtus var. *nana* (Hairy Buttercup). This plant often forms pure associations around the edges of pools. It grows in dense mats and seems to be gradually enveloping the pools.

Winteraceae.

Drimys lanceolata (Mountain Pepper). This aromatic shrub grows in pure associations among granite boulders, where it is afforded a certain amount of protection from the wind.

Cruciferae.

Cardamine hirsuta (Common Bitter-cress).

Rosaceae.

Alchemilla vulgaris (Lady's Mantle).

Leguminosae.

Pultenaea Muelleri (Fragrant Bush Pea), *Daviesia ulicina* (Gorse Bitter Pea), *Hovea longifolia*, var. *aspera* (Mountain Beauty), *Glycine clandestina*.

Oxalidaceae.

Oxalis magellanica (White Wood-sorrel).

Rutaceae.

Phebalium phyllicifolium (Mountain Phebalium), *Pleurandropsis trymalioides* (Star-bush).

Violaceae.

Viola hederacea (Ivy-leaf Violet).

Myrtaceae.

Eucalyptus coriacea, var. *alpina* (Snow Gum). The only tree on the area; it grows as a well-defined unit amongst the granite boulders which surround the flat 20 to 50 feet below. The tree branches from near the ground, and here grows to a height of 15 to 20 feet, and forms an almost impenetrable thicket. The lower limbs are dead, having been killed by heavy falls of snow. Snow Gums form a canopy for small shrubs, such as *Phebalium* and *Pleurandropsis*. *Leptospermum lanigerum* (Woolly Tea-tree). Found in small associations in *Poa caespitosa*-meadow formations. *Callistemon Sieberi* (Alpine Bottle-brush). Only two small shrubs of this plant were found.

Ericaceae.

Gaultheria hispida (Waxberry), *Wittsteinia vaccinacea* (Baw Baw Berry).

Epacridaceae.

Cyathodes acerosa (Crimson Berry), *Leucopogon Hookeri* (Mountain Beard-Heath), *Leucopogon virgatus* (Common Beard-heath), *Monotoca elliptica* (Tree Broom-Heath), *Epacris Bawbawiensis* (Alpine Heath).

Myrsinaceae.

Rapanea variabilis (Mutton-wood).

Gentianaceae.

Erythraea australis (Austral Centaury), *Gentiana montana* (Mountain Gentian).

Labiatae.

Prostanthera lasianthos (Christmas Bush), growing in protected localities under Snow Gum; *Prostanthera cuneata* (Alpine Mintbush), a prostrate plant; *Brunella vulgaris* (Selfheal), a cosmopolitan native plant, representing an interesting ecological study.

Scrophulariaceae.

Gratiola peruviana (Austral Brooklime).

Plantaginaceae.

Plantago tasmanica (Tasman Plantain).

Compositae.

Olearia lyrata (Snowy Daisy-bush), *Lagenophora Billardieri* (Blue Bottle-daisy). This plant was also found with white flowers. *Brachycome Tadgellii*, *B. nivalis*, and *B. scapigera*; *Helichrysum rosmarinifolium* (Rosemary Everlasting, and the varieties *thrysoides* and *stenophyllum*). The species and varieties require further botanical investigation, as they grow under the same conditions, and are easily separated from one another. *Erechtites quadridentata* (Cotton Fireweed).

The flora of Echo Flat was found to contain 27 Natural orders, 46 genera, and 51 species; 22 of the genera were represented by only a single species.

A detailed exploration of Echo Flat has shown the division of species into the above categories; it would be interesting to know if similar localities exist, and the composition of their flora. Of course, the question remains to be solved as to whether this promiscuity, which, in Echo Flat is not confined to certain or individual species, but comprises whole communities, is the demonstration of the inconstance of the species in their choice of sub-stratum, or whether this inconstance is only seeming; that is, caused by local change in habitat. Further ecological search may give the answer. In my opinion, the association is due to the layer of acid humus covering and effecting a change on the granite sub-stratum, or it may be that the washing out of humus is the active factor.

Influence of Summit Climate.

The situation of Echo Flat lends itself to the influence of weather elements. The summit climate is undoubtedly a very important, but likewise very complicated, ecological

factor. It is, first of all, caused by the action of the winds, which has a great influence on the height of the vegetation. Wind acts not only mechanically, but also physiologically. It causes profuse transpiration, as well as evaporation from the soil, which has an effect also on the chemical composition of the soil.

Patches of *Drimys lanceolata*, *Prostanthera lasianthos*, and *Phebalium phylicifolium*, were found dead and reddened; no trace of fungus or insect was ascertained to cause the damage. It is probable that the cause is snow, which lies in a thick cover over these bushes all through the winter. The plants have died for the want of oxygen, indispensable for respiration.

After five days' study of Echo Flat, a start for Marysville, via Buxton, was made. It is seventeen miles to Buxton—through fairly clear country. Bushfires and cattle have helped to open and destroy a beautiful forest area of Red Mountain Ash and Mountain Ash. The most interesting associations met were—(1) *Acacia alpina* (Alpine Acacia), in pure colonies, at an elevation of 4750 feet, not far from Grouse's Rock; (2) *Daviesia latifolia* (Hop Bitter Pea), growing in the same locality on good soil. In the lowlands, this plant is a shrub, generally growing five to eight feet; here it takes the form of a small tree twenty feet or more in height. All the other plants that grow on lowlands and highlands had become smaller and more stunted as the altitude increased. Why has this plant increased in height, size of leaves and attained a different appearance in an exposed locality 4750 feet above sea-level? It is certainly an interesting study in plant ecology.

On the ranges below Echo Flat, Savannah-like forests of *Eucalyptus obliqua*, *E. eugenioides*, and *E. gigantea*, were studied. Still travelling north-west, over mountainous country, we reached a beautiful forest of Red Mountain Ash and White Mountain Ash, growing in mixed association. This timber was being cut into, and seemed to be in perfect condition for the saw.

I desire to offer my sincerest thanks to the Committee of the Field Naturalists' Club for selecting me for this work; to Senator R. D. Elliott, whose foresight has done much for our Club; and to Mr. F. J. Rae, B.Ag.Sc., who accompanied me on the trip and supplied me with geological data.

(This excursion was financed from the grant made available to the Club through Senator R. D. Elliott.—Ed.)

A BLOOD-RED POND.

In a dam, used for watering cattle, and situated about 300 yards from the roadside, between Bundoora and Greenborough, and not very far from the junction with Heidelberg Road, we found *Euglena sanguinea*. The water, for about six feet from the bank of the dam, was the colour of red oxide paint.

A smaller dam, connected with the other, was entirely red; the surface resembled a "granolithic" polish, and was very smooth. This was on April 15, 1929. Beneath the red was a brown slime, about a quarter of an inch in depth, and, when collecting this matter in a jar, our hands were stained a light-brown colour.

Under the microscope, it was seen that the slime contained several spherical organisms, the majority having bright emerald-green around the edge, with a granular red centre. Under white light, many of these organisms changed into elliptical shapes, and squirmed this way and that very slowly, the red colour becoming more diffuse.

The organism was determined as *Euglena sanguinea*, and the two long flagellae were just visible under a 1/6th inch objective. Subjected to red light, the *Euglenae* remained stationary; in spherical form, indeed, these rays not only immobilized the creatures, but seemed to kill a number of them. A change to green light caused a greater number to elongate, and also slowed up the movements of all.

We have often heard of these "ponds of blood," but this is the first time we have seen one, and it is certainly a most interesting sight. The commonest *Euglena* we have found is the emerald green one with the two red eye-spots. The verdant tint is due to the presence of chlorophyll.

The movements are exceedingly diverse, and after watching a number of these protozoa, imprisoned between two glasses, execute spirals, barrel-rolls, eel-glides, cathechine wheels, and other rotatory exercises, we find it very difficult to say what is the normal form of *Euglena sanguinea*.—T. Rayment and R. Dower.

CRESTED GREBE AT BEAUMARIS.

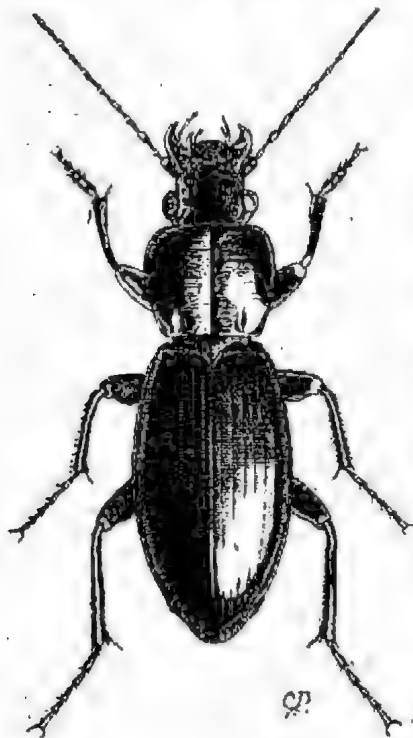
Early in May, my brother and I observed at Beaumaris a Great Crested Grebe, fishing about 50 or 100 yards from the cliff. There were some White-breasted Cormorants about also, and the Grebe was noticeably longer under water at each dive. Watching for half an hour, we were able to admire, through field-glasses, the handsome appearance the birds made, with the black ruff standing out from the white neck, the fawn-coloured patch at the back of the eye, and the black crests standing up at each side of the head, like ears. The body colour appeared to be light buff beneath, and iridescent dark-green back and wings.

W. H. INGRAM

CARABS IN THE GARDEN.

The predacious ground-running beetles beetles family Carabidae, are our friends, and should not be crushed under foot as vermin; confer on them the freedom of your estate. Several species are common in our gardens, one of the largest being *Notonomus*

philipsi, here figured. Its food is some of the pests, which annoy the gardener,



The sudden withering of one or two plants in a bed of *Antirrhinum* bushes is a common occurrence. At the roots of these I have sometimes found a *Notonomus* beetle. Had the beetle done the damage? Froggatt says that *Calosoma*, of the same family, devours larvae and pupae of cut-worms. When the Gipsy Moth, notorious for several centuries in Europe, was threatening the crops of U.S.A., a *Calosoma* from the older Continent was introduced to combat it. In Europe this *Calosoma* was protected by law. I have seen a captive *Notonomus* eat raw meat. The very construction of the jaws suggests seizing prey, and not a vegetable diet. Fabre, in "More Beetles," gives a graphic account of another member of the family, the "gold beetle," *Carabus auronitens*, seizing and devouring caterpillars, and slaughtering even many more of those

creatures than were required for its meal.

Collectors know the savage propensities of these Carab beetles; if placed in a box with others, they devour small insects and dismember large ones. The *Notonomus* found at the roots of a withered plant, doubtless, has eaten a wire-worm grub, the real destroyer of the plant.

With six palpi, instead of four, this family is distinguished from other beetles. For the ventral parts, see diagram in the October *Naturalist*, 1927. This is a very abundant group, more than 1600 species being found in Australia. Length of the beetle here figured is 13/16 inch from jaws to tip of abdomen. The colour is shining black, with tinges of inky blue.

C. DEANE.

The Hon. Librarian notifies that no copies of the "Lilies of Victoria" remain in hand for sale. The words, "Price, 3d.; if posted, 4d.," in last month's issue, page 13, should have been appended to the notice re Supplement to the Census.

BIRD RECORDS.

At Sperm Whale Head (Gippsland Lakes), during September, 1924, I kept a note of the different birds which came under my notice each day of the first week; also the total number of species seen in a week, and, likewise, during the month. For sake of comparison, I decided to make a similar observation in the same locality in September, 1928. Last year's figures show a slight decrease in the number of birds to be seen each day; and for the week 53 species were noticed, as against 56 in 1924; but the total for the month is 72 species, one in excess of the 1924 record.

These figures seem to indicate that, while the same number of species yet exist in the locality, some kinds have decreased *individually*; thus, in a brief period, one now sees fewer different kinds, as compared with a similar period in 1924. I may mention that a decrease in bird-life, but not in species, was my theory prior to carrying out my observations last year; the results of my records for the two years seem to coincide with my belief. It is apparent that some species, and especially small birds, such as Thornbills and Wrens, which were at one time seen almost every day, now come under one's notice only at irregular intervals.

With a sanctuary now provided for the bird-life of Sperm Whale Head, it is to be hoped that a subsequent record may show an obvious increase, both in species and individually.

FRED. BARTON, Junr.

ETHNOLOGICAL SECTION.

A meeting of this Section was held at Latham House on May 21, Mr. A. S. Kenyon in the chair. The subject for the evening was South African native culture. Dr. S. Fern gave an address upon the manufacture of the knife and spear blades in use among the natives, with the characteristic marking near one side of the blade surfaces. Other exhibits were knob kerries, armlets, etc., in use among the tribes.

Mr. Kenyon exhibited many specimens of native craft, weapons in iron and wood, copper wire, string, leather and fibre-work utensils, snuff-holders, a musical instrument and other articles of interest in connection with native life. He showed in illustrations of chipped stones as scrapers, points, etc., the similarity of treatment in South Africa to that of the Tasmanian stone culture, and of some Australian archipacts.

Mr. J. A. Kershaw exhibited several kinds of pipes in use, the question arising whether the custom of smoking was native or introduced among the African tribes. Other exhibits were a somewhat rectangularly-shaped stone of slaty nature, probably used in sharpening operations, and a chusinga-like stone unearthed near Rushworth.

An informal discussion took place over the exhibits. It was decided to devote the evening of next meeting, on Tuesday, June 18, to a consideration of the Maori culture in New Zealand. Members of the Club and friends are invited to be present and to exhibit specimens of Maori art.

EXCURSION TO DEEP CREEK.

This excursion, on Saturday, April 13, was well attended, and the party was increased by a contingent of the Mornington Field Naturalists' Club, to about 60. The route taken, after leaving Mitcham station, was due north until turning off along the Quarry-road. At this corner, situated practically on the watershed dividing the Koonung Creek basin from that of Deep Creek, occasion was taken to point out the physiographic features of the district, and notably the uplifted area of the Deep Creek to the east of this spot.

After a short walk along Quarry-road, the steep-sided valley was reached, where a quarry has been cut out in the hardened Silurian mudstone. To one side of the quarry a pool afforded some occupation to members interested in aquatic life, and the leader, Mr. F. Chapman, secured some interesting amphipods (*Chiltonia*) and hemiptera, such as *Nepa*, while the water abounded in several species of ostracods (*Cyclocypra*) and *Cyclops*.

A challenge was made to the younger members of the party to try to discover the first fossils of the quarry, for hitherto only some obscure worm markings had been found. Some success attended their efforts, and many were soon busy cracking the stones. The results were encouraging, for many doubtful worm burrows were brought to light, some of them perhaps allied to *Kellerites*, while faint impressions of what appeared to be the plume gills of the same type of fossil were detected.

Perhaps the most notable find of the afternoon was a curious *Conularia*-like impression in the mudstone found by Mr. Nilson. This fossil took the form of a long, corrugated band, about two inches in length and about half an inch wide. Such an interesting discovery certainly makes it worth while for a further search for fossils in this quarry.

F. CHAPMAN.

EXCURSION TO MT. WILLIAM.

The Ethnological Section of the Club, on May 5, motored to Mount William, Lancefield. There were about 30 members and friends, in six cars. The party walked some 200 yards from the "parking spot" selected to the most important of the workings.

The outcrops of diabase, which probably belongs to the Heathcote series, and extends from some 10 miles south to more than 30 miles north in marked knobs, occurs in its finest—but is to say, its toughest—form, at the particular spot known as Mount William, and again at its northern extremity at Mount Camel. Even in the outcrops visited, there is specially desirable stone, and that portion of the mass has been followed down for some distance. It is some 20 years since the Club, under the guidance of Mr. F. G. A. Barnard, visited this remarkable relic of our primitive man. It is to be hoped that steps will be taken to preserve this notable spot, which is on private land, as well as the painted rock shelters in the Victoria Ranges and Lang Gharra, near Ararat.

A. S. KENYON.

NOTES FROM MY DIARY.

(By Fred. Barton, junr., Gippsland Lakes.)

October 1.—Plants of *Dampiera stricta* each year send up shoots from the roots; these bear flowers, and die in the following year, being replaced by a successive growth, and so on.

October 4.—Saw the nest of a Black-faced Cuckoo-Shrike; it was placed in the fork of a horizontal limb, and composed almost entirely of fine *Acacia* twigs, held together with a little cobweb and some tufted lichen; three eggs formed the clutch.

October 14.—A pair of Willy-Wagtails has built a nest about three feet from the home of a pair of Magpie-larks, a fine example of the association of these two species.

October 23.—*Hibbertia acicularis*, Prickly Guinea Flower, which flowered profusely last autumn, is again coming into bloom.

October 24.—A Gang-gang Cockatoo around—the first seen for a long time.

October 31.—In a dead Eucalypt stump, about eight feet high, I found the nest of a Crimson Rosella; six eggs were placed at the bottom of a vertical hole.

November 3.—Saw a fine specimen of *Dillwynia ericifolia*, Heathy Parrot-pen, about five feet in height.

November 8.—Discovered the nest of a pair of Rosellas, situated in an unusual place; a large stump where a shed had once stood, had a hole down the centre extending about six inches below ground level, and the female Rosella had laid her large clutch of seven eggs on the rotted wood at the bottom.

November 13.—White-browed Woodswallows, seen and heard frequently throughout the day, some flying at a great height, scarcely discernible with the naked eye.

December 3.—The Rosella's nest, noted on 5th ultimo, now contains six young birds, and I observed them pecking vigorously at the long, grey down on their backs; quills are showing on breast, wings and tail.

December 5.—Black-faced Cuckoo-shrikes have built in the same tree, and in almost the same spot, which they chose for the purpose last year.

December 14.—Found a nest of an Australian Pipit. It is composed almost entirely of dried water-weed, collected from the dry bed of Lake Reeves, about 30 yards distant; built on the ground, and partially sheltered by a bunch of *Salicornia australis* (Glasswort), it contained two eggs, placed on a lining of soft grass. In colour the eggs were almost of a uniform light grey, scarcely sprinkled. First Spine-tailed Swifts seen this summer.

December 22.—Again visited the Pipits' nest; the bird flew when I was about six feet away, and, with its tail spread in a fan-like manner, continued in flight, close to the ground, for a good distance.

December 28.—*Olearia glutinosa*, on the coastal hummocks, in full bloom.

"OXLEY" CARVED TREES.

Photographs of two carved trees, reproduced in the *Naturalist*, May issue, have created considerable interest. Mr. A. S. Kenyon expressed the opinion that the trees were not originals, but probably replicas of the famous ones discovered by Oxley. This proves to be so; Mr. W. W. Thorpe, of the Australian Museum, Sydney, in a letter to Mr. Kenyon, says:—

"These replicas are metal cut, set in concrete bases, and capped against weathering. A monument in stone, with a tablet, was also erected at the same time (or thereabouts) to mark the site of Oxley's discovery. The original tree bole, as represented on p. 11, of the *Naturalist*, is in the Australian Museum (R. 22460); the other opposite p. 12, was restored from Oxley's drawing, as only the stump remained when they were re-discovered by the late Edmund Milne and party in July, 1913."

LUSI NATURÆ.

Malformations have always been, says Goebel, a fertile theme in botanical literature. Often they are induced by insects when nutritive conditions have increased the vegetative potency of the expense of the sexual.

At Sandringham recently, a rare form of *Cortea rubra* was found, with many dozens of flowers in a transitional stage between double and single; some stamens were becoming petaloid. It was natural to raise the question, "Why had the flowers become abnormal?" Was it mishirth or disease that changed the function or configuration? Did a saturated atmosphere contribute to the cause, and, if so, why were dozens of plants of the same species, growing only a few yards away, not otherwise than normal?

Cherisls is a separation that doubles an organ. Had Nature made a mistake, first intending to construct a sexual organ, but had converted it into a vegetative form or created a dual organ? Why were four filaments normally alike (subulate), with normal anther-bearing filaments and other four filaments in the same flowers antherless or with anthers only one-third the usual size, curved instead of straight, the whole filament dilated instead of being so towards the base, the anthers placed horizontally, not longitudinally, as in normal flowers?

Perhaps nature was coming back to primordial form, as stamens were doubtless four-angled leaflets, and, in earlier conditions of their existence, might become leaves or sexual organs. There was indeed a stage when the developing organ might become petal, stamen or foliage. The critical moment was when the spore tissue formed, and then transformation was completed.

A group of Fat-hen (*Chenopodium album*) was found in several forms. A dozen plants showed fruit and stems in beautiful blood colouring, the rich colour pervading the leaves in contrast to the normal green colouring. The Government Botanist considered it was a case of hæmorrhagia, a condition in which the sap flows through the wounds due to the biting of aphides and the flow meeting the air.

A. J. TADGELL.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The annual meeting of the club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, June 10, 1929. The President, Mr. F. E. Wilson, F.E.S., occupied the chair, and there were about 100 members and visitors present.

CORRESPONDENCE.

From Miss C. C. Currie, of Larner, drawing attention to the destruction of ferns and wild flowers, particularly *Boronia pinnata*, in her district.

From the Forest Commission, outlining the procedure to be taken by honorary foresters with regard to the pilfering of native flora.

REPORTS.

Reports of excursions were given as follow:—Tree planting at the Austin Hospital, Dr. H. Flecker; Ringwood to Warrandyte, Mr. A. E. Rodda.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As ordinary members: Miss D. King, Malvern East; Mrs. E. Murdoch, West Coburg; Mr. H. J. Evans, Kew; and Mr. C. Croll, Canterbury. As country members: Mr. L. Mueller, Ravenswood, and Mrs. M. T. Grylls, Dingee. As associate member: Miss V. James, Gardenvale.

ANNUAL REPORT AND BALANCE-SHEET.

The annual report for the year ended April 30, 1929, was read by the Hon. Secretary, and was adopted on the motion of Mr. C. Deane, seconded by the Rev. W. Tippet.

The Hon. Treasurer submitted the balance-sheet and financial statement for the year, which was adopted on the motion of Mr. L. L. Hodgson, seconded by Dr. H. Flecker.

ELECTION OF OFFICE-BEARERS AND COMMITTEE.

The following were declared duly elected: President, Mr. P. R. H. St. John; Vice-Presidents, Mr. C. Barrett, C.M.Z.S., and Mr. G. Coghill; Hon. Treasurer, Mr. J. Ingram; Hon. Librarian, Dr. C. S. Sutton; Hon. Editor of the "Victorian Naturalist," Mr. C. Barrett, C.M.Z.S.; Hon. Secretary, Mr. A. E. Rodda; Hon. Assistant Secretary and Librarian, Mr.

H. B. Williamson, F.L.S.; Committee, Mr. F. E. Wilson, F.E.S. (ex-President); Miss J. W. Raff, M.Sc., F.E.S.; Messrs. C. Daley, B.A., F.L.S.; L. L. Hodgson, A. E. Keep, and V. H. Miller.

On the motion of Mr. F. G. A. Barnard, seconded by Mr. J. Ingram, a vote of thanks was unanimously passed to the retiring officers, with a special mention of Mr. A. G. Hooke, who retires from the office of Hon. Treasurer, which he has filled since 1923.

PRESENTATION.

On behalf of the club Mr. F. E. Wilson presented Mr. L. L. Hodgson with a handsome barometer as a mark of appreciation of his services as Hon. Secretary for the past two and a half years.

LECTURE.

Mr. T. Tregellas spoke of some of his experiences in the Mallee country, and showed a large number of lantern slides illustrating the scenery and some of the more remarkable plants and animals of that area. He particularly spoke of the wonderful nesting habits of the mound-building Loran, or Mallee Fowl.

EXHIBITS.

By Mr. A. L. Scott.—Specimens from Lake Keilambete and Mt. Sturgeon.

By Mr. H. B. Williamson.—Collection of fungi from Beaconsfield.

By Mr. C. J. Gabriel.—Several species of shells, showing fractures repaired by the animal; also, several species of marine shells from various localities, belonging to the genera *Pterocera* and *Strombus*.

By Mr. A. C. Nilson.—Legless Lizard, *Delmar frazeri*. Lizard belonging to sub-genus *Lygosoma*, showing rudimentary fore legs Dragon Lizard, *Amphibolurus muricatus*. Young of Lace Lizard, *Varanus varius*. Black and White Ringed Snake, *Furina occipitalis*; Young Brown Snake, *Diamondia textilis*; Blind Snake, *Typhlops* sp.; Carapace of Murray Tortoise. Two small Eggs, probably reptilian; large Centipede; four examples of doors of Trap-door Spiders; three large Beetles; six types of Land Shells; selection of Water Snails from Murray River; example of Galls, common on Mallee vegetation; types of Mallee Fungi, including vegetable caterpillar, *Cordiceps*; Seeds of Quandong, *Fusinus acuminatus*; Stone Chips from Aboriginal burying ground, Lake Powell; Aboriginal Stone Axe; Map of Bannerton and district, where these specimens were collected.

ANNUAL REPORT.

To the Members of the Field Naturalists' Club of Victoria.
Ladies and Gentlemen,—

Your committee has much pleasure in presenting the Forty-ninth Annual Report for the year ending April 30, 1929, and desires to express its gratification that the continued success of the Club during the past few years has been maintained.

Of the 53 new members elected during the current year, 42 were ordinary members, 7 country, 3 associate, and 1 life. The membership now stands at 1 honorary, 10 life, 82 country, 275 ordinary, and 9 associate members; making a total of 379, and showing an increase of 5 above the total of last year. Losses of members by deaths and resignations amounted to 21, and other names have been removed by a judicious revision of the membership register.

It is with deep regret that we have to record the deaths of two members of long standing in the Club. Sir Aaron Danks was a member for 36 years, and Mr. Dudley Best was a foundation member, an office-bearer, and a regular attendant at meetings. As a result of Mr. Best's kindly forethought, the Club has benefited by a legacy from him of £50, which has been invested separately, under the title of the Best Fund; the accruing interest will be used for the purposes of the Club's library.

The attendances at the monthly meetings have been very satisfactory. The average of over 100, recorded for the previous year, has been maintained; on several occasions standing room only was available. Papers and lectures were contributed by Messrs. E. E. Pescott, F.L.S.; H. B. Williamson, F.L.S.; C. Daley, F.L.S.; F. E. Wilson, F.E.S.; Tarlton Rayment; A. S. Kenyon; C. Barrett, C.M.Z.S.; V. H. Miller; J. Clark, F.L.S.; A. H. Burns, F.E.S.; H. W. Davey, F.E.S.; Dr. Sydney Pern; Dr. R. H. Pullein; Dr. J. A. Leach; and Mr. F. Lewis, Chief Inspector of Fisheries and Game. The subjects were very varied, dealing with many phases of natural history, and nearly all were illustrated by excellent lantern slides and well-selected specimens. An innovation was the holding of an Aquarium Evening, at the April meeting, which was very successful; many interesting and attractive exhibits were shown.

The excursions continue to be a popular feature of the Club's activities, and are generally well attended. The programme has been fairly well carried out, and where excursions had to be cancelled, it was on account of unavoidable

reasons. Of the 38 excursions that have been successfully conducted during the past year, 25 were half-day trips to institutions within the metropolitan area and the nearer country districts; 10 were whole-day visits to places further afield; and on public holidays, extended excursions of several days' duration were made to Bendigo, Cape Woolamai and Warburton. For this year's programme, the committee will welcome suggestions and offers of leadership.

Our journal has now completed its 45th volume. Under the able editorship of Mr. C. Barrett, C.M.Z.S., the high standard of the *Victorian Naturalist* has been well maintained. Members are again reminded that the Hon. Editor is always anxious to receive suitable material for publication. Mr. H. B. Williamson has contributed a valuable series of articles on the "Lilies of Victoria," in seven parts, and illustrated by his own drawings. Another feature is a series of "Notable Naturalists," contributed by several authors. Many other articles of an interesting and instructive nature, mostly illustrated, have been contributed by members and others.

The Annual Wild Flower Show was held in the St. Kilda Town Hall on October 2, 1928, and was opened by Miss Irene Vanbrugh, the talented English actress. In addition to a large and beautiful exhibit of wild flowers from nearly all the Australian States, there were additional attractions in the form of natural history specimens. One of the ante-rooms was devoted to an exhibition of pond life, microscopic and geological specimens, in charge of Miss J. W. Raff, M.Sc. In another room, Mr. C. Gabriel exhibited selections from his conchological collection, together with ethnological and other specimens, lent by the Geological Survey Museum and private collectors. It is estimated that 1704 persons attended the show, and of the receipts, amounting to £176, a sum of £17 was donated to the Lord Mayor's Fund for charitable purposes.

During the year the Club initiated a strong protest against the proposal to throw open the Cumberland Valley to saw-millers. It was thought that the magnificent timber standing in this valley should remain as a heritage to posterity and a permanent example of the vanishing glories of our mountain forests. The matter was warmly taken up by the metropolitan press and the general public, and at the request of the Club, several other societies, of a more or less kindred nature, combined in the protest, and were represented on several deputations to the Minister for Forests. As matters now stand, 640 acres are to be permanently reserved, and a thinning out

of the remaining area will be permitted. Any further effort to increase the area of total reservation will be heartily supported by the Club.

A request was also made by the Club to the Government to purchase an area at Cape Woolamai, with the object of preserving the mutton-bird rookeries, but the reply was that no funds were available. Other matters in which the Club co-operated with the Town Planning Association and other societies were the reservation of 75 acres of land near Healesville, and the Dandenong Police Paddock as national parks.

The anonymous donation to the Club last year of £200, through the good offices of Senator R. D. Elliott, has been further drawn on, providing facilities for exploratory excursions by Club members. Messrs. H. B. Williamson, J. Clark and F. P. Morris have independently visited remote districts in the State. Valuable material has been collected, including several new species of plants and insects. As a tribute to Senator Elliott's efforts in this direction, he has unanimously been elected a life member of the Club. Mr. W. Lawford, of Benalla, who generously presented a valuable set of Mathews' *Birds of Australia*, has also been thanked by election to life membership. Our generous fellow-member, Mr. V. H. Miller, has added to his numerous other gifts to the Club by presenting 10,000 printed envelopes for the *Naturalist*, and also a valuable book on spiders. Other books added to the library are a *Complete Natural History*, presented by Miss Best; *The Journal of a Naturalist*, presented by Mr. E. A. Vidler; and *Wanderings in Australian Wilds*, presented by the author, Sir Baldwin Spencer, F.R.S.

The committee has accepted, with much regret, the resignation, on account of ill-health, of Mr. L. L. Hodgson, as Hon. Secretary. Since his election to the office in 1926, Mr. Hodgson has not spared himself in furthering the interests of the Club in every possible way, and the gratifying increase in membership during his term of office is in no small degree due to his untiring efforts.

The committee has again to acknowledge the kindness of Messrs. Coghill and Haughton, in placing their offices, in Swanston-street, at the Club's disposal for committee meetings. Twelve monthly and one special committee meeting have been held during the year, the attendances being as follows:—Mr. H. B. Williamson, 13; Messrs. F. E. Wilson, P. R. H. St. John and A. E. Rodda, 12; Messrs. C. Daley and V. H. Miller, 11; Miss J. W. Raff, 10; Mr. C. Barrett, 9; Messrs. L. L. Hodgson, A. E. Keop and Geo. Coghill, 8; Mr. A. G. Hooke, 7; Dr. C. S. Sutton, 6; and Mr. E. E. Prescott, 3.

In conclusion, your committee desires to express its thanks to members generally, and all others who have contributed to the furtherance of the aims of the Club and the accomplishment of a successful year. It is confidently hoped that the same loyalty and co-operation may be extended to the incoming committee during the ensuing year.

F. ERASMUS WILSON, President.

A. E. RODDA, Hon. Secretary.

FIELD NATURALISTS' CLUB OF VICTORIA.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR TWELVE MONTHS, ENDED APRIL 30, 1929.

RECEIPTS.

To Balance in Bank on May 1, 1928		£51 11 7
„ Subscriptions—Town Members—		
Current Year	£214 4 0	
Arrears	41 19 0	
In Advance	20 6 0	
Country Members—		
Current	44 12 6	
Arrears	11 11 6	
In Advance	4 15 0	
Associate Members—		
Current	4 10 0	
Arrears	2 0 0	
	£343 18 0	
„ “Victorian Naturalist”—		
Subscriptions	6 7 6	
Cash Sales	2 1 8	
Reprints Charged	1 2 6	
	9 11 8	
„ Donations—		
To Publishing Fund	1 0 0	
Special	0 5 0	
„ Legacy from Estate of the late Mr. Dudley Best	50 0 0	
„ Interest from Savings Bank	11 14 8	
„ Sale of Club Badges	2 3 0	
„ Plant Census Account—		
Sale of Books in Year	27 7 6	
„ Wild Flower Exhibition, 2nd October, 1928—		
Ticket Sales	33 7 0	
Cash at Doors	55 9 0	
Sales of Plants, Flowers and Refreshments	80 6 3	
Donations	7 1 4	
	176 3 7	
„ Transfer from Savings Bank Account		622 3 5
		20 0 0
		£693 15 0

EXPENDITURE.

By "Victorian Naturalist"—

Printing	£254 16 11	
Illustrating	52 16 6	
Wrapping, Despatching and Postage	32 9 10	
Reprints—Free	17 3 9	
Reprints—Charged	0 19 9	
	<hr/>	£358 6 9
" General Printing		8 3 0
" Library Account		2 5 0
" Plant Census Account		27 15 0
" Donations to Advisory Council for Fauna and Flora		1 1 0
" Rent and Caretaker (for two years)		33 14 0
" Charabanc Fund		0 15 0
" Postage, Bank Charges, Insurance and Sundries		11 10 6
" Transfers to Investments—		
Late Mr. Dudley Best Fund		50 0 0
Part Proceeds Wild Flower Exhi- bitions of 1927 and 1928		72 0 0
" Wild Flower Exhibition—		
Hire of St. Kilda Town Hall	£14 14 0	
(Plus deposit paid pre- vious year, £1/1/-).		
Purchase of Plants and Flowers	43 6 9	
Printing, Advertising and Postage	8 19 6	
Hire, Cartage, Freight and Materials	42 13 1	
	<hr/>	109 13 4
Donation of part proceeds Lord Mayor's Fund for Austin Hospital		17 0 0
	<hr/>	692 3 7
" Balance in Bank on April 30, 1929		1 11 £
		<hr/>
		£693 15 0

SPECIAL TRUST ACCOUNT.

To Balance in Hand, May 1, 1929	£119 0 0
	<hr/>
	£119 0 0
By Expenditure in Year—	
Printing and Charges	£52 10 3
Outlay on Field Work	46 8 6
" Balance in Hand, April 30, 1929	20 1 3
	<hr/>
	£119 0 0

Audited and found correct.

W. H. INGRAM

A. S. BLAKE Hon. Auditors.

STATEMENT OF ASSETS AND LIABILITIES
ON APRIL 30, 1929.

ASSETS.

Arrears of Subscriptions, £62: estimated to realise	£40 0 0
English, Scottish and Australian Bank, Current Account	1 11 5
Investments—	
Best Fund, E.S. & A. Bank, Fixed Deposit, at 5 per cent.	£50 0 0
State Savings Bank Debentures, at 5 per cent.	200 0 0
State Savings Bank Current Account	30 0 0
State Savings Bank No. 2 Account	72 0 0
	352 0 0
Library and Furniture, Insurance Value	400 0 0
Stock of Badges on Hand, Cost, less Sales	9 18 2
Plant Census Account, Difference between Cost and Sales of Books	122 6 8
Special Trust Account	20 1 3
Accounts Owing to Club—	
For Reprints Charged	0 19 9
For Advertisements in "Naturalist"	4 0 0
	4 19 9
	1950 17 3

LIABILITIES.

Subscriptions Paid in Advance	£25 16 0
Late Mr. Dudley Best Fund	50 0 0
Balance of Charabanc Fund	1 17 0
Outstanding Accounts	22 10 11
Special Trust Account	20 1 3
	1120 5 2

Examined and found correct on June 4, 1929

W. H. INGRAM

A. S. BLAKE Hon. Auditors.

A. G. HOOKE, Hon. Treas.

A CORRECTION.

About three years ago I wrote concerning the habits of the Spangled Drongo, at Sperm Whale Head. Lately, in the township of Foster, I have closely studied some birds—undoubtedly the same as the supposed Drongo at the Gippsland Lakes— but which are unmistakably the English Blackbird. So it is apparent that I was in error regarding the identification of the Spangled Drongo. The birds at Sperm Whale Head were exceedingly shy, which did not facilitate observation. I had not then heard of the Blackbird's occurrence anywhere in East Gippsland, so, when trying to identify these strange birds with what details I could obtain in regard to appearance, habits, etc., the Spangled Drongo seemed most probable, as this species had on occasions been noted at the Lakes.

FRED. BARTON, Junr.

REPORT OF THE ETHNOLOGICAL SECTION.

Since the beginning of the year, in June, 1928, when Mr. A. S. Kenyon was appointed chairman, and Mr. C. Daley Hon. Secretary, 11 meetings have been held, of which two were at the Royal Society's Hall, eight at Latham House, and one at the residence of Dr. S. Pern, to view his fine ethnological collection.

Although the attendance at the meetings has not been numerically great, the interest in the various subjects on the syllabus has been well maintained. The subjects treated have been:—"Boomerangs," by Dr. S. Pern; "Exhibition of Specimens," by members; "Early History of Man," by Dr. S. Pern; "The Artistic Development Among the Australian Aborigines," by Mr. C. Daley; "Lake Dwellings," by Mr. J. A. Kershaw; "The Future of the Australian Aborigines and the Constitution and Activities of the South Australian Anthropological Society," by Dr. R. H. Pultein, of Adelaide; "The North American Indians and Their Culture," by Mr. A. S. Kenyon; "An Account of the Two Aboriginal Caves at Glen Isla," by Mr. A. S. Kenyon; also of the recently discovered rock shelter with paintings, at Langi Ghiran; and "South African Native Culture," by Dr. S. Pern.

An evening was also fixed for the September meeting of the Field Naturalists' Club, when Mr. C. Daley gave an interesting lecture on "The Stone Axe," illustrated with many specimens of various types. A feature of the meetings has been the varied and numerous objects exhibited by members, illustrating every phase of ethnological study.

At the monthly meeting of the Ethnological Section of the Club, at Latham House on June 18, there was a poor attendance. Mr. A. S. Kenyon exhibited a varied collection of objects, illustrating Maori culture; Mr. Hyam a figured amoan mat and a bone from the leg of the extinct Moa; Mr. Mitchell an unusually-shaped and hafted axe from Bougainville Island. A general discussion took place respecting the exhibits, their origin, use and significance. The next meeting night will be Tuesday, July 16.

TREE-PLANTING AT AUSTIN HOSPITAL.

A party of more than a dozen visited the Austin Hospital on Saturday, May 18. Through the good offices of Mr. St. John, some fine native plants were obtained from the Botanical Gardens. These, together with a few brought by members, were planted in a conspicuous part of the hospital grounds, where a beautiful garden already exists, containing many native shrubs and trees. We are indebted to the matron and one of her assistant sisters for their hospitality and for providing refreshments.

H. FLECKER.

THE CUCKOO-BEES, *COELIOXYTS FROGATTI* COCKERELL.

By Tarlton Rayment.

When the "great madness" descended on the world in August, 1914, a "murrain" fell also on the honey-bees. At the first onslaught, few people were free of anxiety and sorrow, so that the mere dwindling of the beehive populations excited no comment, except among apiarists. But soon this obscure phenomenon began to reveal itself in a very sinister direction—the home-grown food supply of Great Britain was seriously diminishing. Scientists realised that, without the honey-bee to effect pollination of the blossoms, certain crops would ultimately disappear.

The Government at last took steps to re-populate the empty beehives of the land. Bee experts were despatched to Holland to purchase many thousands of straw "skeps" containing the black native bees of that country. Shiploads of the honey-harvesters duly arrived in Britain, and the "little Hollanders" at once set out to carry on the essential work of plant-fertilisation. The needs of the country were once more being satisfied by a natural process.

But what of the cause of the mortality? Did no one endeavour to solve the riddle? Mr. Wood, a progressive Scottish gentleman, provided the money that enabled Doctor J. Rennie to undertake the necessary research work.

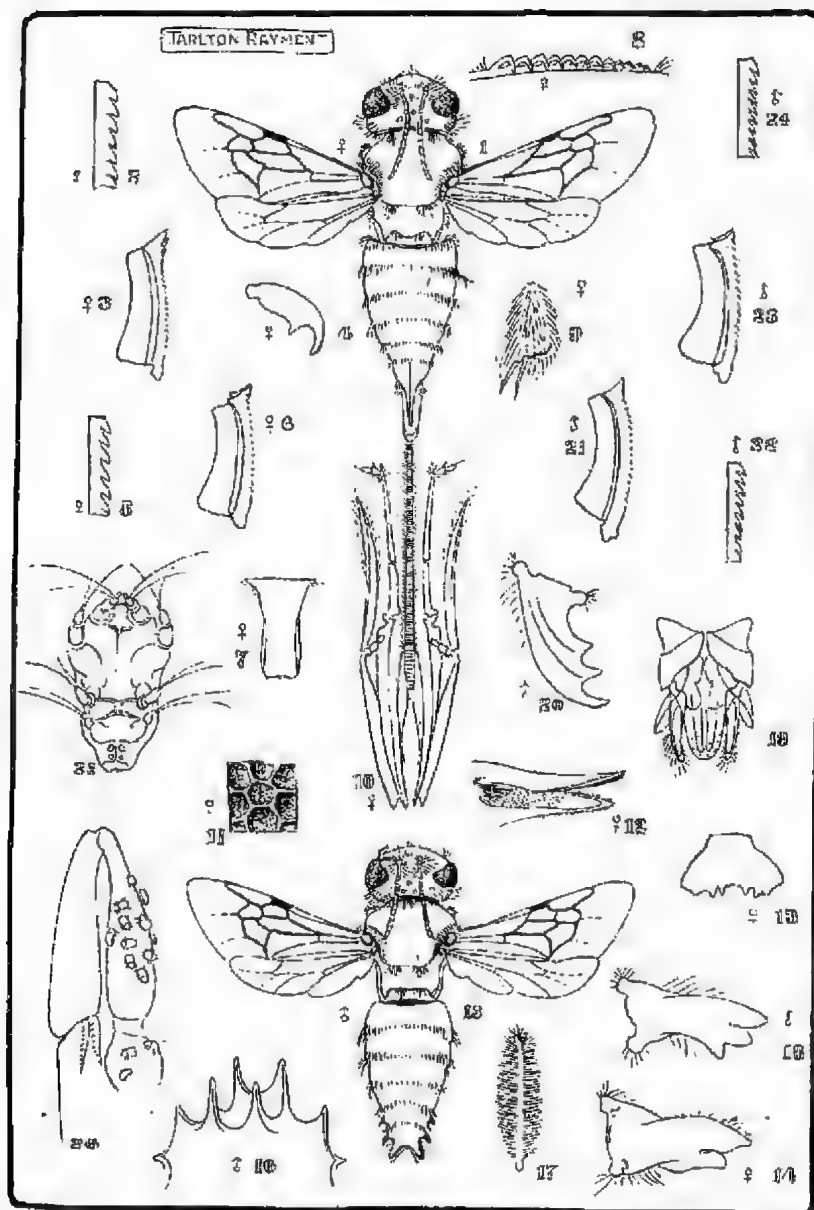
The honey-gatherers of Great Britain died of suffocation. That was the verdict of Dr. Rennie, at the end of five years of experimental labour. (*Trans. Royal Soc. Edinburgh*, Vol. LII., part IV., John Rennie, B.Sc., Phillip Bruce White, B.Sc., and Miss Elsie J. Harvey. "The Bee World," 1921, 1922, John Rennie, B.Sc.).

The cause was no other than a mite, *Tarsonemus woodi*, that had crawled into the thoracic breathing tubes—tracheal system—of the bee, and there multiplied to such an extent that the air passages became choked with their bodies. The death of the honey-bee was inevitable. Fumigation with a volatile compound* was proved to have some remedial effect.

After Doctor Rennie had isolated the cause, he concluded that the mites had always been closely associated with some

*R. W. Frow (*British Bee Journal*, Jan. 12, 1928), gives the following formula:—"A mixture made of one part of safrol oil; two parts of nitrobenzine (oil of mirbane), and two parts petrol." Cover top of honeycombs with a quilt of porous material; place on this a piece of camphor. Over the whole is distributed from three to six pipettes of the mixture. The treatment should be given preferably in the evening.

Plate III.



Cuckoo-Bees.

wild hymenopterous host, but had "suddenly discovered" that the air-tubes of the honey-bee offered very much better breeding quarters, and so concentrated in those vital passages. The discoveries aroused great interest. On the Continent, a Swiss scientist, Doctor Zander, declared that there were two species of this Acarid mite, one kind living in the trachea, and the other on the exterior of the honey-bee, as normal parasites.

I have headed my article, "The Cuckoo Bees," and I have taken you right round the subject to Europe, to talk about the mites. I have unconsciously imitated the procedure of the novelist who announces the end of the story in the first chapter, and must clear up the *denouement* to the best of my ability. I have read that, in India, there is a female carpenter-bee, which is always accompanied by a mite (*Greenia*). This parasite shelters in a cavity in the first abdominal segment, on the dorsal surface, and it has been suggested that this remarkable association is so ancient that the integument of the wood-boring bee has actually been modified to provide a resting-place for its unwelcome neighbour. I am not impressed with this effort to find evidence of evolutionary change, because hundreds of other bees—notably the Furrow-bee (*Haliictus*)—have a similar depression on the same segment, but there is no accompanying mite to take possession of such propitious quarters. There is another fact which makes me sceptical, but serves also to bring me back to the beginning.

When I read Doctor Ronnie's suggestion, that the mite had deserted some wild hymenopterous, I determined to bear in mind that observation. Although I have made some hundreds of dissections of hive-bees, which had died showing every symptom of mite infestation, yet I have never succeeded in determining the presence of the creatures. Judge of my delight, then, on microscopically examining a small *Prosopeid* wild-bee from Booroolooloo, in Northern Australia, to find a few Acarid mites ensconced in the exceedingly coarse puncturing of the *metathorax*. Finding no suitable abdominal cavity, such as that of the Carpenter-bee, it simply availed itself of any other shelter that offered, namely, the deep pittings of the integument. Owing to my downright and unpardonable haste when mounting these mites, I lost the minute bodies—a circumstance much to be regretted.

Later I had occasion to dissect, for the completion of the plate accompanying this article, a male and female *Coelioxys froggatti*, and when removing the front legs of the former, I was delighted to discern a number of golden-yellow mites attached to the *coxa* and the *femur*. I say I am pleased to find in Australia evidence supporting the English scientists'

deductions. The mites, then, are normally parasitic on the bodies of wild-bees in England, the Continent, and Australia. The species indigenous to the last-named country, and on which mites have been observed by me, are *Haliectus raymenti* Cockerell, *Prosopeis ruficornis* Rayment (n.s.), and *Cochioxys froggatti* Cockerell.

The mites are included in the small Family Tarsonemidae, and they lack the hard exoskeleton of insects, being soft-bodied. "The females are tracheate, and usually exhibit prominent hairs upon the *tarsi* of the last pair of legs. The body is more or less segmented dorsally. The mandibles are needle-like, the palps slender and minute. The females possess, in many instances, between the first and second pair of legs, a pair of delicate rounded or club-shaped organs, which have been designated by Oudemans *pseudo-stigmata*. The legs are short, with six or fewer joints. They are bedecked with a limited number of stout hairs, which terminate in claws. The *tarsi* of the first pair possess a single claw, the second and third two. The fourth *tarsus* varies in the different genera. Suckers are frequent. There may be distinct sex dimorphism, especially in the genus *Tarsonemus*."

An acarid mite has been found in the human body, and a *Tarsonemus* has been recovered from a cancer of a mouse, a *papilloma* of a horse, and a *sarcoma* of a dog. Doctor Bruce White says that the entrance of *T. woodi* to the *trachea* of the honey-bee is gained through the roots of the air-sacs, the female mite often penetrating to the secondary *trachea* before depositing her eggs, so that infestation of the primary *trachea* is inevitable. This condition is apparent by the dark bronze faecal deposits on the lining of the tubes.

My species of *Tarsonemus* answers very well to the generic description set out, and it is necessary for me to bestow on the parasite a suitable title. Time will provide additional material and a student, so that the bee-mites of Australia may ultimately be placed in a new genus, but until some specialist undertakes the study of the group, I propose to include this mite in the European genus. I have placed the type in the Melbourne Museum, but owing to difficulties in securing publication for my m.s. description, I now give the specific name of *Tarsonemus australis*.

But what of the *Cochioxys froggatti*? Alas, I do not know her haunts. I have been told by an observer in Queensland, that he has seen these Cuckoo-bees entering the nests of their relatives, the leaf-cutting bees (*Megachile*). But I have no doubt that they are lacking in industries, and are parasitic on their hosts. There is plenty of evidence (Oswald Latter,

F.E.S., "Bees and Wasps") that the European species *C. quadridentata* frequent the nests of the leaf-cutter bee, *Megachile circumcincta*. I have long known that the habits of bees are singularly constant, being seldom, if ever, affected by political or geographical boundary lines. The poet is corroborated; the little fleas have smaller fleas, and so on *ad infinitum*.

KEY TO PLATE.

1. Adult female of *C. froggatti* Gkll. Legs not shown.
2. Serrated edge of calcar.
3. Strigil or antenna-cleaner of European female, *C. conoides*.
4. Claw of *C. froggatti*.
5. Edge of calcar of *C. conoides*.
6. Strigil of Australian *C. froggatti*.
7. Labrum appendage of female.
8. Hamuli or wing-hooklets of female.
9. Tarsal joint of *C. froggatti*.
10. Tongue or glossa of *C. froggatti*.
11. Portion of integument, highly magnified to show the coarse puncturing.
12. Apical end of abdomen of female *C. froggatti*: lateral view.
13. The clypeus of the female.
14. Mandible or jaw of female.
15. Adult male *C. froggatti*; legs not shown.
16. Pointed processes of male abdomen.
17. The hairs of the patches are short, stout and characteristically plumose.
18. Jaw or mandible of male.
19. Genitalia of *E. froggatti*.
20. Another view of the male jaw.
21. Strigil of European male, *C. conoides*.
22. Edge of calcar of *C. conoides* male.
23. Strigil of Australian *C. froggatti*.
24. Edge of calcar of *C. froggatti*.
25. Acarid mite, *Tarsenemus australis* Rayment, ventral view.
26. Coxa and femur of male *C. froggatti*, showing the infestation.

SOUTH AUSTRALIA'S SNAKE PARK.

Recently I visited the Zoological and Snake Park, situated at Outer Harbour, South Australia. Herein are housed gorgeous tropical birds, mammals, also poisonous reptiles, such as the Brown Snake, Tiger Snake, Death Adder, and others. There is also a tame, non-venomous Python in a cage. Any tourist or visitor to the park is welcome to handle this reptile, or, to have it gracefully entwined round neck, arms or body. Some visitors avail themselves of this opportunity, and when so "adorned" have a photograph taken, which later probably is shown to admiring friends!

The park was established for the purpose of studying Australian reptiles, and for the production of anti-venom serum for injection after the bite of any deadly Australian snake. The curator is always on duty during the daytime to handle the birds, mammals and reptiles, and to explain snakebite treatment. In a small glass receptacle he exhibits poison in the form of powder, and explains how it is crystallized from the liquid form obtained from the reptile.

(MISS) S. A. AUDAS.

POLLINATION OF *CRYPTOSTYLIS SUBULATA* (LABILL.) REICHB.

By (Mrs.) Edith Coleman.

In previous issues of the *Naturalist*—May, 1927, and April, 1928—the pollination of the small Tongue-orchid (*Cryptostylis leptochila*) was described. It was shown that the flowers of the orchid were visited by the males only of an ichneumon fly (*Lissopimpla semipunctata*) in circumstances suggesting that they were stimulated by sex instincts. These insects entered the flowers in a reversed position, removing the pollinia on the tip of the abdomen, instead of on the head.

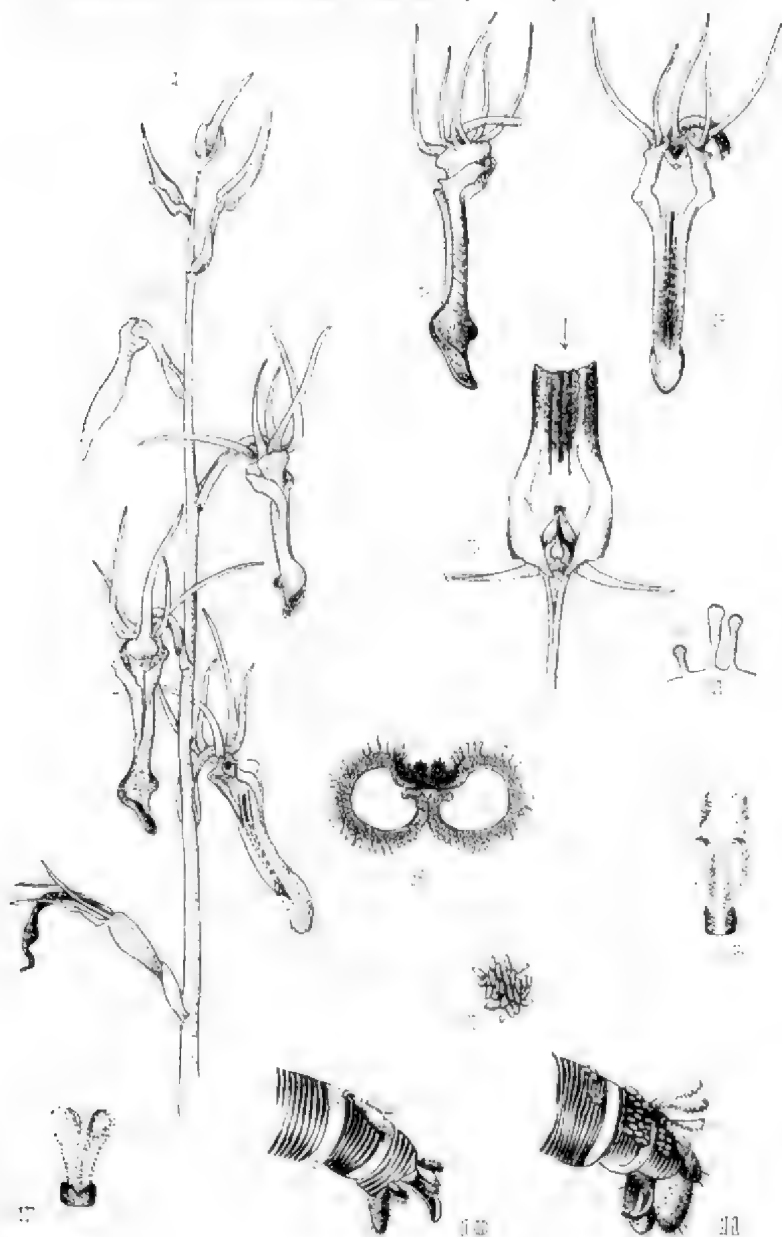
The present paper deals with the pollination of the large Tongue-orchid (*Cryptostylis subulata*), which, I find, is visited by the same species of insect in even more remarkable circumstances.

The normal season of *C. leptochila* extends from the end of December to the middle of March (my notebook gives dates as late as April and May), and its range, in Victoria, is restricted to the south and east. *C. subulata* has a wider range, and is common in localities in which *C. leptochila* has not been recorded. It flowers from November to late January. This season it was not so abundant as usual, and, at first, I experimented with negative results. Later, with only two racemes of *C. subulata*, I found that they were visited, and successfully pollinated, by *Lissopimpla semipunctata*, which acted exactly in the manner previously described. This was in December, before *C. leptochila* came into flower.

In January, 1929, owing to the kindness of Mr. A. B. Braine, I was able to experiment with 10 racemes. These were exposed alone, or with flowers of *C. leptochila*. Both species were visited indiscriminately by the male ichneumons, which frequently entered one species while carrying pollinia from the other.

In the case of *C. subulata*, the removal of the pollinia is accomplished in a much more remarkable manner. It alights on the lamina of the labellum near the thickened lobes, at some distance from the rostellum, and is thus upside down "under" the labellum. In this inverted position, it must "back" a considerable distance, in order to reach the viscid disc to which the pollinia are attached. This is accomplished swiftly and accurately, without any apparent hesitation.

Some of the smallest insects, whose bodies measured less than one-third the length of the labellum, removed the pollen-masses as successfully as the largest had done



Details of *C. subulata* flowers, pollinia, etc

Although, in both species of *Cryptostylis*, the flowers are reversed, in visiting *C. leptochila*, the insect is not at any time inverted. Moreover, it receives some support from the upward curve of the labellum, which offers an easy hold. In *C. subulata*, the shape of the labellum is not so favourable to the visitor, which appears to drop from the flower as soon as its legs have released their grasp of the labellum. For this reason, it is difficult to secure an insect *in situ* for photography. As they drop into the killing-bottle, flower and insect become separated. I have plans which, I hope, may overcome this difficulty next season.

Using chloroform, without detaching the flower from the stem, I was not more successful. The insect became limp, and fell at once from the orchid, carrying the pollinia with it, the disc adhering to its body slightly higher than when it visited *C. leptochila*.

In both species, the structure of the organs concerned with reproduction follows the same plan. The column is short and broad. Owing to the reversion of the flowers, the saddle-shaped stigma lies a little above the anther, its middle lobe produced into the prominent rostellum, to which the pollinia are attached. The mealy pollen grains are held together in two compact, bi-lobed masses, attached by short candelae at their apices to the viscid disc.

Some of our Australian orchids are fitted with contrivances to secure self-pollination. These are probably, though not certainly, never crossed. Others have a modified mechanism for both self and cross pollination. A third group, to which *Cryptostylis* belongs, can only be pollinated by outside agency, and its flowers appear to be wholly dependent for pollination on insects.

We have good evidence that hybridising between closely-related species of orchids sometimes takes place. Having established the fact that both species of *Cryptostylis* are visited and pollinated by the same insect, it is surprising to find no hybrids between them. I have never seen a specimen which might even suggest hybridising, nor has Dr. R. S. Rogers, who is familiar with all the species in the various States.

Mr. W. H. Nicholls, in Victoria, who has had many opportunities of close observation, tells me he has seen no hybrid in the genus.

My notebook shows both species to have flowered at the same period, in at least one locality. On January 10, 1929, Mr. Braine and I found 13 racemes of *C. subulata* and a few fine *C. leptochila* within the space of a few yards. Some of these were visited again, and found with fine capsules. On

FIG. IV.



Cryptostylis subulata, showing mature flower (upper), and fading flower (lower). Lower flower shows position of labellum as flower unfolds. Its margins then become reflexed as in top flower.

The labellum in the fading flower again takes position shown in lower flower. The inverted position of the insect can be thus followed. *C. subulata*, showing later changes in the flowers, also one capsule. Under normal circumstances, the lowest flowers are pollinated. This raceme, and that of another specimen, were flowering with *C. leptochila* at the base of the same tree.

February 17, we found *C. subulata* and *C. leptochila* in flower at the base of the same tree, and close together, in other parts, were racemes of both species bearing well-set capsules. We also saw several insects bearing the unmistakable yellow pollinia on the tips of their abdomens.

Although there is a slight difference in the point of attachment to the abdomen of the insect, experiments show that, after the usual drying and contraction of the disc, the pollinia of *C. subulata* project over the tip in a position well adapted to strike the stigma in either species.

It is possible that anther and stigma in the two species mature at different periods; that pollen from one is incapable of fertilising the other. I hope to satisfy myself on this point next season. It is also possible that hybrids between them may yet be found.

Cryptostylis ovata, E.Br.—a raceme of the West Australian species (*C. ovata*); on which only one flower had not entirely faded—was exposed with the other two species. This one flower held a very great attraction for the ichneumons, which hovered above it, and made many attempts to enter the limp, travel-worn bloom.

On such slight evidence, I should not care to make any definite statement; but from the actions of the insects, it is my belief that, should *Lissopimpla semipunctata* occur in Western Australia, within the range of *C. ovata*, it is responsible for the pollination of that orchid.

The plate shows a raceme of the orchid *C. subulata*. This was in bud when I received it, and was visited by the insects only under my observation. The well-set capsule shows that one flower has been successfully pollinated. The change in the shape of the labellum as the flower matures will be noted. The buds are, at first, erect. As they mature, a twist of the ovary brings them into the inverted position.

Along the lamina of the labellum two raised lines form a double keel, which expands into two prominent, thick lobes near the end (see fig. 2). The insect alights with its head on, or near, these excrescences, from which point it "backs" to reach the rostellum.

I am greatly indebted to Mr. Tarlton Rayment, the Melbourne hymenopterist, for the plate, and to Miss Edna Corker, Boxup Brook, for the specimen of *C. ovata*.

KEY TO ILLUSTRATIONS.

1. Spike of the orchid *Cryptostylis subulata* (Labill.), Reichb.
2. Lateral view of flower.
3. Anterior view of flower.
4. Interior, at base of labellum, arrow shows the direction of the insect's approach.
5. Section, transverse, of labellum.
6. The surface of the labellum is covered with elongated nodules, and the purple pigment is found in the apices.
7. The pollinia, when first withdrawn, are bi-lobed, but—
8. Shortly after two extensions are thrown out from the centre.
9. A group of pollen grains: they are larger than the granules from *C. leptochila*, F. von M.
10. Apical end of abdomen of male ichneumonid (*Lissopimpla somipunctata*, Kirby), with pollinia from *C. subulata* and *oedocagus*, extruded.
11. Dorsal segments of abdomen, with pollinia from both orchids and numerous loose granules.

RINGWOOD TO WARRANDYTE EXCURSION.

Twenty members walked from Ringwood to Warrandyte and back on Monday, June 3. The road, after passing the Ringwood boundary stone, is very picturesque, as it winds over and around low-timbered hills, with here and there cleared areas of vivid green around small dairy farms or coloured patches of chrysanthemums cultivated for the metropolitan markets. From the higher points, views of the hills were obtained. The Dandenong, Yunga and Plenty Ranges, and the distant Mt. Macedon, showed up clearly, visibility being remarkably good.

Where the road dipped into the gullies of small creeks, some of the characteristic gully vegetation was found. Cassinias, Hazel Pomaderris, Christmas-Bush (*Prostanthera*), Hop Goodenia and Silver Wattles were noted, and on the steep banks of the creeks, tender fronds of Maidenhair Fern grew profusely, with here and there seedling Clematis plants, with their beautifully veined and coloured leaves. A feature of the wayside was the variety of strange and beautiful fungi in scarlet, orange, canary-yellow, grey, brown and chestnut, or banded in delicate neutral tints. At the sides of the road, on the higher parts, grew large Puff-balls, patterned so as to be hardly distinguishable from the stones around them.

Very few plants were in bloom. The green variety of *Correa* was found in many places, a few flowers of the White Heath, Sweet Bursaria, and the Common Apple-berry (*Billardiera*) were showing. On the poor, stony soil beside the road, the Drooping Cassinia hung its rusty brown tassels. The low hills around Warrandyte are thickly timbered with a somewhat stunted growth of Eucalypts, which are badly infested by the Drooping Mistletoe: many trees being killed by it.

Billies were boiled at a picturesque little flat on the bank at the Yarra, where a small island, covered with white-plumed reeds (*Phragmites*), divided the swift-flowing stream. Here plants of the Prickly Currant Bush (*Coprosma*), Woolly Tea Tree and Dodder Laurel (*Cassutha*) were examined. Among the few birds noted during the walk were the Scarlet-breasted Robin, Noisy Miner, Striated Thornbill, Bell-Magpie, Rosella, White-throated Tree Creeper and Collared Butcher-bird.

A.F.R.

SAND DRIFT IN THE MALLEE.

By A. D. HARDY.

(Forests Department of Victoria.)

The "Mallee" in Victoria is part of a much larger area, which extends into New South Wales and South Australia. The greater part of it is well vegetated, and therefore "wilderness," if you like, but not "desert." It has arid climatic conditions, but neither in deficiency of rainfall nor in paucity of fauna and flora does it conform to "desert" in the strict sense of the term. If left alone, or managed with foresight and great care, it will be one of the world's greatest granaries. On the other hand, the Mallee soil surface is a tenderling watched by a ravening beast. The beast, for innumerable years, has been held powerless; but in recent years man with axe and fire and plough is fraying the leash, and, with every additional square mile of sandy soil exposed by indiscriminate removal of forest cover, the imminence of serious trouble, or even disaster, becomes the subject of anxious discussion.

The forested parts of the Mallee bear generally several species of Mallee Eucalypts, belts of Cypress-pine (*Callitris*), and Belar (*Casuarina*), and, scattered among or associated with these, or forming small groves, species of *Fusanus*, *Pittosporum*, *Heterodendron*, *Myoporum*, *Eremophila*, *Acacia*, *Hakea*, *Banksia*, *Melaleuca* and other small trees. Where no forest is, there are grass plains and shrubberies of Turpentine and Hopbush, low and hard barren ridges, bearing Porcupine and Sclerophilous shrubs. Elsewhere there are shrub heath tracts and flats, and depressions covered with salsolaceous plants and their associates.

The sandhills of the Victorian Mallee have, generally, an almost east and west trend, i.e., at right angles to the direction of fierce, hot northerly winds, and, with the surrounding country, indicating a wind-blown region, explained by geologists as a raised estuarine area. At first there was nothing to bind these sands, but gradually the whole area became vegetated, and the humefied surface was held down until, with axe, fire and plough, man came to till the soil.

Instances of erosion can be seen along the north-western railways that traverse the Mallee district; evidence of the beast snapping and biting, as in promise of what may happen if its prospective prey becomes more and more unprotected. Within easy reach of Ouyen, on the Mildura line, on the Robinvale line, north-east of Lake Tyrrell, and in the Tim-

heron Timber Reserve, there are conditions which cause any but the unobservant to speculate on the future with anxiety. There are wheat-fields with the surface soil blown away, others with alien sand piled on to them, roads at times stopping the motor cars, which, perhaps on the previous day skimmed along on a hard surface, and fences buried. There are cases reported where a third fence has been erected high over the originally fenced survey line.

In the Chinkapook district I photographed a section of partly buried fence, with a second fence erected above it, and a cyclone gate with only its upper fourth part exposed. This drift occurred across a three-chain road, from a cultivated field, from which all Mallee scrub had been removed. The finer soil grains had blown ever so far away in dust clouds; the heavier sand grains had rolled, skipped or trundled along to be arrested by any obstacle offering, eddying about its base and piling into a little dune beyond. The approach to the gate had been cleared of road vegetation, but, where the native Mallee scrub remained on the road margin on either side of the gate, it had arrested the sand, both as wind-break and barrier, and the original fence stood unencumbered on the marked survey line.

This, only one of the many affected localities, is south from Chinkapook, and east from what is known as Meridan Road (143 degrees east long.). In May, harrowing operations in another field resulted in a long stream of sand dust blowing ahead of the team, parallel to the direction taken by a drift in a near part of the field. Here the sand drift from a field on opposite side of a road had buried the fence, and piled up over the cultivable area. Between the part in active cultivation and the sand hill which occupied road and part of the field, a wind-swept area was dotted over with miniature hummocks, each of which almost concealed a "Padyamelon" (*Cucumis myriocarpus*).

Reclamation work in the Landes of France is known to most readers, but the less known enterprise in Palestine may be mentioned. After the war, an increased demand for land, and the increased value of any land available in that country made it desirable to reclaim the dune sand area in the neighbourhood of Gaza and Acre, and experiments attended with much success have been carried out during the past few years. It is of interest to Australians to know that, in addition to the Marram grass (*Ammophila arenaria*), a pioneer in sand fixation, used here and in other parts of the world, the shrubs and trees used most successfully were chiefly

of Australian species, viz.—*Acacia longifolia*, *A. cyanophylla*, *A. melanoxylon*, *Eucalyptus rostrata*. Several species of *Pinus*, *Populus* and *Tamarix*, etc., were also employed. Of these, the pines mostly did poorly or failed, but the *Tamarix*, *Eucalypt* and *Acacias* gave satisfactory results. Of the *Acacias*, the prime favourite was *A. cyanophylla*, because of its easy establishment and rapid growth. The seed of this species was obtained from dune plantations in the island of Cyprus.

The Mallee sandhills, unlike those of the North African and Asian deserts, are indefinite parts of the sand plain on which they appear as eminences, whereas the latter generally rest on hard formations, which constitute the desert floor. It is an important difference, since, in Victoria, there is nothing to prevent the ascent of subterranean water, and thus there is obtained internal dampness of the dune, and the resulting permanent cover of vegetation and consequent stability—at least until interference with the surface gives the wind a chance to destroy what is so laboriously built up.

Firing by man, and trampling by stock are two of the main causes of the transition from resting-dune to active-dune, and, perhaps, ultimately to wandering-dune. Damp sand is immobile, and the surface of the sandhills is damped by contact with the humid air without, as well as by moisture resulting of capillary attraction within. The humidity of the air in contact is increased by the vegetation, which draws water from a considerable depth, and evaporates it at or near the surface. If we remove this vegetation, aridity of the locality is at once increased. If we clear extensive areas of sandhill and plain, whether with fire or axe, the aridity of the whole region becomes intensified, the sand dries out quickly, and the fierce northerlies—strong enough to shift some hundreds of thousands of tons of sand on to the smiling plains—are invited to their work of devastation. Who is bold enough to say that the invitation would never be accepted?

The height of coastal dune and inland sandhill is limited by the lifting power of the wind, which is generally incapable of raising sand grains much over 300 feet, so that the dune comes to rest, but is liable to demolition by the very force which built it, unless it be bound by vegetation, and even then, if gaps are caused by man tracks or cattle pads, developing into wind channels, the consequent undermining and uprooting of adjacent shrubs and trees may intensify movement, and the blowing away of the crest of the dune.

Sandhill formation, in localities suggesting lack of harmony with the general scheme of things, can be seen on the alluvial flats of the Murray River on Gunbower Island. In many places the large heaps of sand appear to have been dumped down by an unseen power, and without apparent evidence of their origin; but the suggestion that they are deposits from collapsed whirlwinds, which operated during one of the great dust-storms, is not unworthy of consideration.

In Mr. A. Hone's report (made available in m/s by courtesy of the Forests Commission) there is mention of a homestead almost walled in by sand drift, rendering the boundary fence of the paddock a mere internal core of a sand dune, up to 15 feet in height, and with a third fence surmounting it.

Other instances of the transporting power of the wind are as follows:—In various Mallee localities the salt bush, Dillon bush and other shrubs are perched—some places 4 feet above their original ground. Between them and around them the wind has scoured and eroded the land into the appearance of a maze, and the missing soil may be miles away. Some of the sand remains through the binding action of the roots and the arresting capacity of the branches which make a semi-solid mass, at times up to six feet. Such occurrences may be seen on the lower Murray plains, and to a less extent in the vicinity of Lake Tyrrell, and are on the undulating or level plain. In dune areas, such wind channels begin with the making of man-paths or cattle pads, and there often follows conversion of fixed-dune to active-dune, and consequent damage to the pastoral lands to leeward by blown sand littered with uprooted trees and general vegetable debris.

Under the New Zealand Government much dune reclamation work has been done and reported by Dr. Cockayne, and in Victoria, the inland movement of coastal dune sands is being resisted in places.

The remedy for sand-drift in the Mallee lies in arresting the wholesale and indiscriminate clearing of vegetation from the wheatfields and the roads; and in planting where too much exposure has already been made. No further narrowing of wide roads should be permitted. Continuous belts of forest and scrub should be kept along both sides of the roads. Windbreaks and shelter-belts should be insisted on in the case of all new occupations, and owners of denuded holdings should be compelled to restore such protection at at least quarter-mile intervals. Where roads have been narrowed, the strips, in certain cases, should be resumed or the planting of the lost road width enforced.

FLORA OF SOUTH AUSTRALIA.

Students of Australian plants will welcome the fourth and concluding part of Mr. J. M. Black's fine work, which has been published by the South Australian Government as one of a series of handbooks issued by the British Science Guild (South Australian Branch).

Mr. Black is to be congratulated on the completion of a book which is worthy of a place among the finest of the world's descriptive Floras, and which is a monument of persistent effort and careful research on the part of the author.

The Flora contains descriptions of 117 families, 730 genera and 2430 species. Of the genera, 580 comprise indigenous species, numbering 2064. Genera containing alien plants, are 150, with 366 more or less well-established species.

The Orchids have been fully dealt with to the extent of 40 pages, by Dr. Rogers, of Adelaide, the well-known specialist in the family.

As an introduction, a concise History of Botany in South Australia is presented, followed by an extensive glossary of botanical terms covering ten pages, and a handy measurement scale is added, designed for converting the metric system into inches and lines.

The indexing is very comprehensive including as it does all family, genus and species names with an indication of the accented syllable, a list of all authors of species, and a short index of popular names. Regarding the last it will be felt, among members of the Field Naturalists' Club of Victoria, that an opportunity has been missed for extending the use of many of the vernaculars given in the census of Victorian plants to one, at least, of the other States.

As probably over two-thirds of the wild plants of Victoria are described in the book, Victorian collectors will no doubt find it very useful.

In the six years during which the Flora was in course of publication, much material came under the purview of the author, and a good deal of revision work had been done by botanists in Australia and elsewhere, so that he considered it advisable to make the work up-to-date by an addendum of 33 pages of "Additions and Corrections." Included in these are abstracts from revisions on *Pandanus* and allies; *Stipe*, by Miss D. K. Hughes, and *Casuarina*, by Miss Macklin.

In the revision work incidental to the compilation of such a book, discovery of errors in plant names, which have for long escaped detection, is inevitable, but the correction of these, though likely to cause some inconvenience to the older generation of collectors, is just as necessary under the rules of the Vienna Congress of Botanists as are the changes in nomenclature by ornithologists and entomologists. One example may be cited:—A plant was described and named by Forster fl. in 1786, as *Craspedia uniflora* and botanists have been in error in following Cassini, who, in 1812, named it *Craspedia Richea*. Those who claim to be flower-lovers, and not botanists, will not mind the change back to the prior name, since they still have the pet name "Billy Buttons" for the plant. About a dozen such changes, in less well-known plants, have been made in names of plants common to both States. It appears, also, that over a dozen new names will have to be listed in our Victorian Census owing to Mr. Black's investigation of specimens sent to him from this State, mostly in cases where he cannot agree to the keeping together of certain forms under one species name.

The book is printed on art paper, which shows up to advantage the author's beautifully-executed drawings, of which there are nearly 400, many of them full-page illustrations.

GIPPSLAND'S GIANT WORMS.

Size alone has made it famous; and the Giant Earthworm *Megascolides australis*, McCoy, of Gippsland, is hardly an attractive subject for study unless one is keen on the annelids. So I went to South Gippsland in quest of *Megascolides*, not because my soul was absorbed with worms (remember Darwin's phrase in a letter, I fancy); but anxious to secure specimens for the Museum, and gain some first-hand knowledge of the monsters.

My host at Loch (Mr. L. C. Cook), smiled at the suggestion of rarity when the Giant Earthworm was under discussion. In suitable areas, he said, the creatures abound, and next morning several fine examples were obtained from a very small plot of moist ground. Subsequent diggings also were rewarded. I might have collected 50 specimens, without much exertion, from the flats near the farm. One little creekside "cliff" contained many burrows; and from it nine or ten worms were taken, some whole, others in sections! It was impossible to avoid cutting through annelid bodies, the tunnels being curved and going up and down in any direction but that which the spade was made to follow. Digging out a small specimen was fairly easy; to extract a large one, complete, a task needing much care and patience.

Though Giant Earthworms exist in thousands in the Bass Valley, perfect specimens are seldom collected. It means both toil and trouble to secure them. Many, of course, are turned up by the plough in virgin soil, but usually in sections.

As regards records, Mr. Cook told me that the largest *Megascolides* he had actually seen measured nine feet in length, wholly extended. The largest "reported" measured 11 feet, while worms six feet long were fairly common. The average perhaps, is four feet—such examples would measure about half the length when contracted. Even a six-foot specimen can shrink to very moderate size.

The Giant Earthworm has a preference for rich river flats, it likes clayey ground, but also burrows freely in slopes with a southerly aspect. In autumn and winter it is found near the surface, only a foot below it often; in the summer it goes much deeper down, but a sudden heavy shower brings many to the surface on the flats. They dry up quickly in the sunshine, their bodies shrink and become brittle, breaking easily as a twisted tube of glass.

Walking over the flats or newly-ploughed ground, where the plough has not been before, one hears frequently the loud gurgling noise made by Giant Earthworms, contracting in their burrows, which, vertical or horizontal, are always damp or slippery, and may contain much liquid mud, or water. The worms travel quickly through their tunnels.

Eggs of *Megascolides* are found in numbers. Often they are picked up among the clods in a freshly-ploughed paddock. They may lie free in loose soil, or be fixed among grass-rootlets, netted all over like a moth cocoon enclosed in an open-work silken casket. They are tough and horny, oval in shape and measure from two to three inches in length. They remind one of the large pods of a brown seaweed, which children find on the beaches and "explode" by stepping upon them or crushing between the fingers. When fresh, the egg capsule is of a greenish colour, and translucent.

CHARLES BARRETT.

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'FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, July 8, 1929. The President (Mr. P. R. H. St. John) occupied the chair, and there were about 100 members and visitors present.

CORRESPONDENCE.

From the President and Committee of the Victorian Horticultural Society, inviting two representative members of the Club to their Annual Meeting on July 18. The invitation was accepted and the Club's Vice-Presidents (Messrs. C. Barrett and G. Coghill) were nominated.

REPORT.

A report of an excursion to the Zoology School, Melbourne University, was given by the Leader, Miss J. W. Raff, M.Sc.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As Ordinary Members: Miss H. Bailey, Melbourne; Mrs. B. Kilvington, Hawthorn. As Honorary Member: Sir Baldwin Spencer, K.C.M.G., F.R.S., etc.

GENERAL.

The question was raised as to the advisability of the Ethnological Section continuing to rent rooms for their meetings. The matter was referred to the committee.

LECTURE.

Mr. P. R. H. St. John gave an interesting talk on Australian trees and shrubs suitable for cultivation. The lecture was illustrated by a large number of excellent coloured lantern slides, prepared by Mr. Reeves for the Commonwealth Cinema and Photographic Branch, showing flowering sprays of Eucalypts, Melaleucas, Leptosperms, Callistemons, Acacias, Banksias, and others. Mr. Reeves was heartily congratulated on the beauty of the slides, many of which were made from specimens in the Melbourne Botanic Gardens.

EXHIBITS.

By Mr. W. S. Abraham.—Portion of jaw of large shark (*Carcharias* sp.), showing five rows of triangular teeth.

By Geological Survey of Victoria, per Mr. W. S. Abraham.—Two specimens of Tachylite from Spring Hill, Parish of Coliban. This form of glassy basalt has been used by aborigines for weapon making.

By Mr. J. Searle.—Some rare, or curious, crustacea: *Cumaceat* sp., from Corio Bay; *Gnathia ferox*, from Frankston; *Phyllosoma* larva of crayfish; six stages in the development of the Mantis Shrimp. *Squilla* sp., *Anaspides tasmaniae*, *Paranaspides lacustris*, *Koonunga cursor*. Mounted specimens of Brine Shrimp, *Parartemia Zeitziana*, from Lake Corangamite.

From Melbourne Botanic Gardens, per P. R. H. St. John.—Flowering specimens of *Banksia spinulosa* (Smith) Pro-

By C. J. Gabriel.—Species of marine shells, "Thorny-

teacea, New South Wales, Queensland. oysters," genus *Spondylus*, including *S. tenellus*, Reeve, Victoria and Tasmania; *S. nux*, Reeve, Ascension Island; *S. aurantiis*, Lam., Philippines; *S. Imperialis*, Chem., China; *S. nicobaricus*, Chem., Great Barrier Reef, Q., and Mauritius, attached to coral. "Thorny-oysters," inhabiting Pacific Islands, India, Australia, etc., usually found in deep water, adhering to rocks and coral. They have sometimes been found attached to cables brought up for repair.

MUSSELS IN A DAM

Three years ago last March young relatives from the Gunbower district who were on a visit, brought some freshwater mussels with them to tempt the fish in the Yarra to bite. A few of the molluscs that were left (six or eight in number) were placed in a dam on my property at South Warrandyte, and their existence forgotten. Two months ago the dam was drained for the purpose of being deepened, and a few days later I noticed numerous irregular lines in the mud, and, on investigation, found that these were caused by mussels moving from the drier parts towards the little water still remaining. I was surprised, however, to find traces of nearly 30 altogether, some being no more than one inch long, the largest being about four inches, probably the specimens that were originally put into the dam. Some were just emerging from the mud in which they had buried themselves. Others had slowly moved along till they reached the very soft mud, where they were again burying themselves. I watched those which were still moving for a considerable time—they drew themselves along, and the movement was almost imperceptible—in fact, in the course of a whole day they had moved only a couple of feet. There are no weeds of any sort in the dam, and the water during the summer months is almost clear. It seems surprising that with so little apparent food the mussels should not only keep alive but actually breed in waters so different from those of their accustomed habitat.

A.E.O.

COMMON SHORE CRABS OF PORT PHILLIP.

By Melbourne Ward.

The crab as an organism holds a very high place among the invertebrates of the sea. Primarily, it is a scavenger, and performs a very important part in the economics of Neptune's realm, in this respect, being analogous to the insect of the terrestrial world. Adult and juvenile crabs are entirely dissimilar in appearance, owing to the fact that development of the embryo in the egg reaches only an early stage before the larval crab is cast into the sea to fend for itself as a nightmare creature, with goggly eyes and spiny body.

Some crabs (Dromiacea) have a more direct development, the young appearing from the egg as miniatures of the adult. They remain gripped on to the long feather-like appendages of the female until they become large enough to start life as separate entities in their perfected state. However, this appears to be rather an exceptional form of development, most crabs passing through somewhat dangerous metamorphoses, during which they swim about in the eerie plankton world at the surface of the sea.

The adult forms are as diversified as the microscopic larvae. Moulded by the rigorous hand of necessity, we find crabs imitating pieces of coral, old shells and weeds; others sheltering in the mantles of molluscs; still others building tunnels among the roots of mangroves; all the varied species meeting and overcoming the difficulties of their special environment. From the abyssal depths of the ocean to the tree-tops of tropical jungles, we find the crab in some form; sometimes as a small paper-thin creature, living in the water caught in the bases of palm trees; again, as large, fierce animals, capable of endangering human life. In size, they range from minute forms to the great spider-crab of Japan, *Macrocheira kaempferi*, with its nippers spreading to twelve feet. Even in our own Bass Strait, there dwells a Goliath among crabs, attaining the world's record weight of 30 lbs.

The growth of a crab is effected by a process of moulting, during which the hard exo-skeleton is cast, or discarded, in one piece, the newly-moulted crab being a pitiable, soft weakling, incapable of defending its life against the many enemies who wait to pounce upon it. During this dangerous period the crab hides itself under stones, or in a crevice, until the new armour has formed upon the surface of its skin. The everyday life of the crab is so fraught with dangers, alarms, battles with its fellows, and hair-breadth escapes from the

rapacity of birds and fishes, that Nature has seen fit to bestow upon it the power of regrowing the limbs and appendages lost during such encounters. This power often causes rather odd malformations, for, when a nipper is injured, a second one may form from the injury, resulting in a crab with two nippers in one. In some of the small Tropical Porcelain crabs, we find the habit of seizing a collector's finger with one of the nippers, and then casting the body loose from the nipper, which continues to remain attached to the finger while the wily little crab makes good its escape.

Among the hurly-burly of marine life, one sometimes comes upon partnerships between organisms of widely different groups; here a marine worm living in the same shell as a hermit crab; there, a crab carrying in each nipper a small sea anemone.

In Arctic and Antarctic regions the crabs attain their maximum in number of individuals, but in the warmer seas there is a greater variety and numbers of species, and fewer

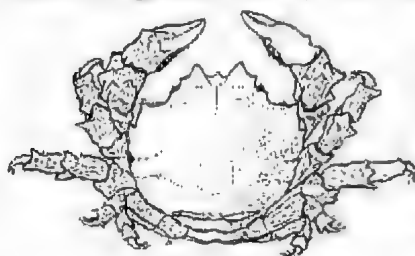


Fig. 1.

Individuals. And so, in Port Phillip, we find about twenty - three common species, most of which are present in large numbers.

Now, as it is customary to discuss the family ties and relationships of new acquaintances, it would be appropriate for me to

follow the time-honoured custom and introduce our friend the crab with a few remarks concerning its family tree, before getting down to the fauna of the Port Phillip reefs, beaches and mud-flats.

Racially, the crabs belong to the vast Phylum, Arthropoda, articulated animals having jointed limbs. Included in this are the spiders, centipedes, millipedes, and insects, as well as the Crustacea. The crabs and their allies form what is generally known as the higher Crustacea, or Decapoda, ten-legged Crustacea. The order Decapoda is divided into two sub-orders, Natantia and Reptantia, meaning swimming and crawling, respectively. The former contains three tribes, and may be disposed of at once, as they are the prawns and shrimps. In Reptantia there are four sections—Palinura, the common crayfish, and its allies; Astacura, the common freshwater crabs and yabbies; Anomura, containing four tribes of quaint creatures, the commonest in Port Phillip being the

hermit crabs, Paguridea; and, finally, the Brachyura, or true crabs. Here we find three tribes, with one of them divided into two sub-tribes, and in these last two sub-tribes we find our common Port Phillip crabs.

The following table is taken from that set forth by Dr. W. T. Calman:—

ORDER	DECAPODA		Tribe.	Penaeidea	
SUB-ORDER	NATANTIA	{		Stenopidea	Prawns, Shrimps.
SUB-ORDER	REPTANTIA			Caridea	
SECTION	POLINURA	{		Scyllaridea	Salt water crayfish and some small deep sea forms.
SECTION	ASTACURA			Eryonidea	
SECTION	ANOMURA			Nephropsidea	Yabbies and their kin.
				Galatheidia	Small deep sea types, with one small species on the reef at Flinders.
				Thalassinidea	Small lobster-like forms, found under stones on sand.
				Paguridea	Hermit Crabs.
				Hippidea	Nut-shaped crabs, found in tropical climates.
	BRACHYURA			Dromiacea	Sponge crabs; one sp. on reef at Flinders.
				Oxystomata,	Pebble crabs, mostly in deep water.
	BRACHYGNATHA			sub-tribe Brachyrhyncha.	
				"	Oxyrhyncha.

The Dromiacea, or sponge-crabs (fig. 1), so called on account of the curious habit of carrying a piece of living sponge over the dorsal surface of the carapace, and thus appearing as a small growth of sponge on the lower surface of the stone under which they hide, show points of resemblance to the lobsters, and are considered the most primitive of the true crabs. There are a number of genera and species in Victorian waters, but only one species is common on the reefs at Flinders. This is a very sleepy little crab, *Petalomera lamellata*, marked with green and yellow; it is found sheltering under stones at the edge of low tide.

The Oxystomata, pebble-crabs (fig. ii.) are globular little creatures, with extraordinarily long, thin nippers, chelae, and fragile little limbs. The box-crabs, and *Matula* of the tropical coast, are, of course, differently shaped, but the species of *Ebakia* and *Philyra*, inhabiting Port Phillip, are all characteristically globular. The mouth-frame of crabs is roughly square, but in the tribe under consideration we find that the frame is narrowed to a point anteriorly, hence the name *Oxystomata*, or sharp-mouth.

Most of the species of Oxystomata are denizens of the deeper waters, but at Queenscliff there occurs *Philyra laevis*

in large numbers. In the shallow waters, these tiny crabs are to be seen feeding and mating. The males perform clumsy gyrations around the object of their desire—a slow love dance, with waving nippers—that seem to gain no response from the coy female. Sometimes several males gambol for the same prize, until, at last, one more successful than his rivals, seizes his mate in one of his long nippers and rushes off in true Arabic style, pursued by the other irate and disappointed suitors. The crab buries itself under the sand when danger threatens, and leaves only the eyes protruding above the surface. This operation takes a second or so to accomplish, but in the closely allied *Matuta* of the tropics, the feat is performed with a speed reminiscent of a magician—at one moment the crab is quietly wandering along the surface of the sand; the next, there is a puff of sand, and, presto! no sign of the crab!

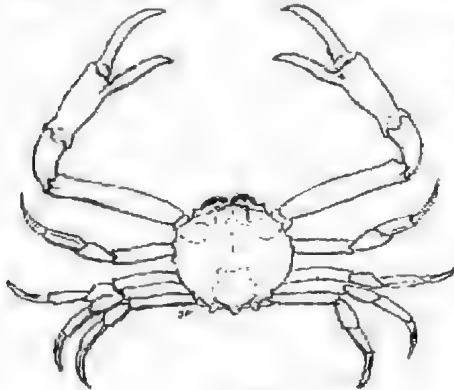


Fig. 11.

The tribe *Brachygna-*
tha, as we have seen, is
comprised of two sub-
tribes, *Brachyryncha*
and *Oxyryncha*; the
members of the latter
tribe are also known as
spider-crabs (fig. III.),
and are characteristic of
weed patches in a few
fathoms. There are several
species that also occur
on the reefs, and
one, *Paramithrax minor*,
often is found on stones

covered with weed on the reef at Beaumaris.

The common genus of spider-crabs in Port Phillip is called *Naxia*. There are three species; *Naurila* is the largest, and occurs in the shallow bay at Swan Island; the other two, *N. tumida* and *N. spinosa*, inhabit the ocean reefs at Flinders. One of the interesting things about the spider-crabs is their wonderful method of camouflage, which is accomplished by the placing of strands of weed, living sponges, and other colonial animals upon the surface of their limbs and the carapace. The bodies of the crabs are covered in stiff, curled hairs, and if the crab is one that covers itself with weed, each strand is selected with apparent deliberation, and is fixed in the curled hairs with gesture reminiscent of a lady putting pins in her hair. The weed is always fixed on end so that it floats up into the water; and when the crab is completely covered, the weeds sway with the action of the water

In the case of the sponge-covered crab, the sponges grow so that the identity of the spider-crab is lost; and, viewing it in its natural habitat, it becomes an integral part of the surroundings. Experiments tried with weed-crabs have shown that the crab is aware of the colour of its surroundings to such an extent that one covered in red weed, when placed in an aquarium of green weed, immediately removed its covering of red to don the green that would allow it to sink into obscurity.

The sub-tribe Brachyryncha is comprised of fourteen families, only five of which need be taken into consideration for the purpose of this paper. The first family is the Portunidae (fig. iv.); these are the swimming-crabs, and are recognisable by the flattened paddle-like pair of legs. In Port Phillip there are several genera and species; one, *Ovalipes bipistulatus*, is a

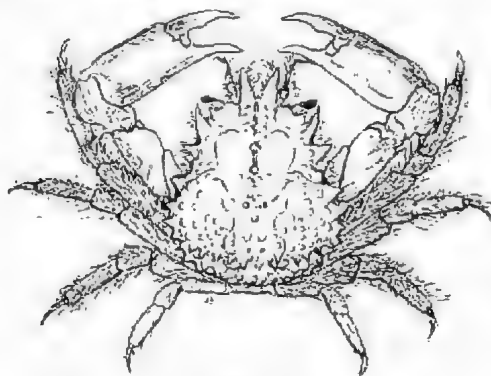


Fig. III.

circular, creamy-white crab, with two large red spots on the posterior part of the carapace. It occurs in shallow water on sandy beaches, and often is taken in the fishermen's nets. Along with it is a large red swimming-crab, *Nectocarcinus integrifrons*, usually not in such large

numbers; for the usual habitat of the latter are the crannies under large stones in shallow water at the edge of the reefs at low tide. At Flinders, *Nectocarcinus tuberculatus* is found associated with *N. integrifrons*. The edible blue crab is recorded from the Bay.

The most interesting Portunid is the English shore-crab, *Carcinides maenas*, whose presence in the Bay is really remarkable, though it is a widely distributed form. Alcock (*Carcinological Fauna of India*) gives the following note on its geographical distribution: "The species has been found at various places on the Atlantic coast of the Northern United States and off the coast of Pernambuco (Brazil); it is the common shore-crab of the British Isles, and occurs in the North Sea up to almost Arctic limits, in the Baltic, and on the Atlantic coast of the European continent. It is common in all parts of the Mediterranean, and has been found in the Black Sea

and in the Red Sea. It is an Indian species, though a rare one, and has been reported from the Hawaiian Islands and from the Bay of Panama." He doubts the presence of the crab in Australian waters; but since the above notes were written, a good deal of work has been done, and *Carcinus*, or *Carcinides*, is really present in the Bay in large numbers. It is a big crab, and is to be found under stones on the reefs at Beaumaris and elsewhere, also on the exposed mud-flats at Port Melbourne, where it lies half buried in the little pools left by the tide.

The family Xanthidae (fig. v.) is represented by three common forms, one of which, *Heteropanope serratifrons*, is to be found under stones on mud at the Yarra mouth. The drab colouring and coating of silt assumed by the crab, combined with the habit of feigning death upon detecting the

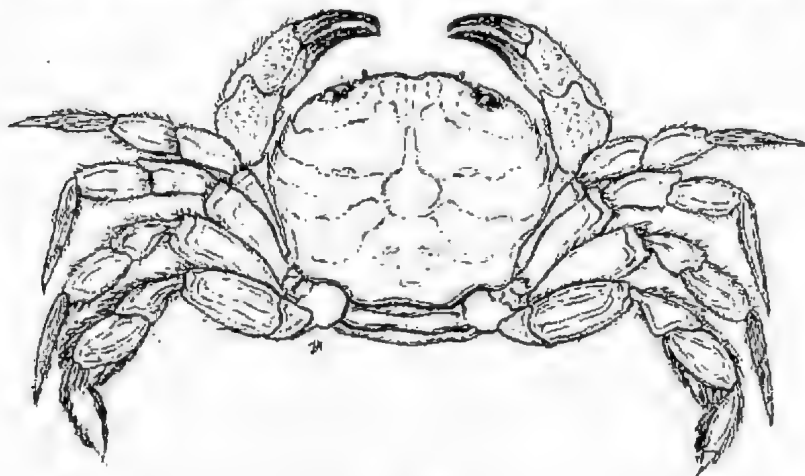


Fig. IV.

presence of an enemy, make it an awkward quarry to collect, as one must be very sharp to perceive it. The other two genera are to be found on the reefs, both occurring under the stones just below low tide. The larger of the two is *Pilumnus monilifer*, whose nippers are covered with a short, brown pile, and the colour is usually dark plum. At Beaumaris, these crabs are common in labyrinths of caves formed by the loosely-lying stones. The smaller is an extremely lethargic crab, *Heteropilumnus fimbriatus*. It is not very common, and is to be found under stones on sand.

Probably the commonest and most numerous of the reef types are the Grapsidae (fig. vi.), which dwell under the

stones. Near high tide mark, the smooth *Cyclograpsus audouinii* has its lair, and we usually find several under the same stone. Their colour is dark plum to reddish-brown, with irregular lighter blotches on the carapace and legs. Nearer the low-tide level there are three species of *Paragrapsus*: *P. quadridentatus* is olive-brown, with very small black spots. It is very numerous under stones on sand, both in the Bay and on the ocean reef at Flinders. The two related species, *P. laevis* and *P. gaimardii*, excavate hiding places under stones on mud, and the former is very common at Port Melbourne. Individuals of these species may be separated by the wider and thicker body of *P. laevis*.

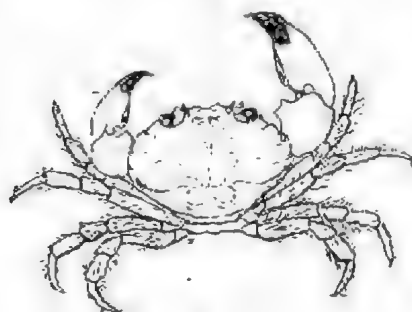


FIG. V.

On the weed-covered rocks at St. Kilda, one will often see a small dark green crab, *Eriocheir spinosus*, whose small size and sharply square carapace are unmistakable. At the Yarra mouth there are low banks of clay, and these are riddled with the burrows of *Helice huswellianus*, a small, light brown crab. All the Grapsoid crabs are able to remain

out of water for considerable periods, enough moisture being retained in the gill chambers for this purpose. Respiration is per medium of feather-like gills, situated in compartments above the bases of the ambulatory limbs. The water is drawn in through apertures at the base of the nippers, and is circulated through the gills and passed out at the anterior corners of the mouth-frame. This may, at times, be reversed, water being taken in through the mouth-frame and passed out at the base of the nippers; a certain amount of water would also be drawn in through the narrow space between the edge of the carapace and the bases of the walking legs.

In some of the tropical *Sesarma* crabs of the mangroves, which remain for lengthy periods out of the water, we find a type of radiator formation. The bodies of these crabs are very thick, and the walls of the carapace above the nippers are crossed and recrossed by shallow trenches, which impart the appearance of a grater. Just below the eye-socket there is a deeper trench running from the outlet apertures of the gill chambers, and along this the water is passed, and allowed to dribble down the intricate grooves, during which, the

oxygen absorbed by the crab is replaced and the rejuvenated water again drawn in at the base of the nippers.

The last of our families is the Ocypodidae. Two genera occur, both of which are mud-flat types—*Heloeccius cordiformis*, a purple crab, with long nippers, and *Hemiplax latifrons*, commonly found on the mud-flats at Port Melbourne. The latter is a small crab, matching the dull colour of its surroundings perfectly; it digs burrows in small pools, and is to be seen moving over the bottom behind the breakwater at St. Kilda.

There are lots of very interesting and rare types of crabs in Port Phillip, those here dealt with being the commoner varieties. If anyone who reads this article would care to take up the study of crabs, I should be delighted to be of assistance. Forward specimens to me for identification, and I will do my best and return them with any information desired.

In the classification of species belonging to the disputed genera, *Paragrapsus* and *Chasmagnathus*, the work of Tesch, "Siboga" Monograph XXXIXC., pp. 124-125, has been consulted, and his example followed.

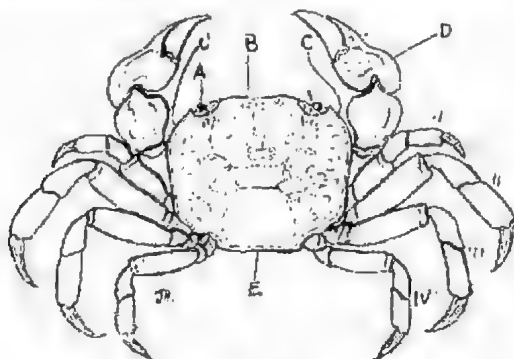


Fig. VI.

EXPLANATION OF FIGURES.

Fig. I.—The Sponge-crab, *Petalonera lateralis*, the common Dromiid of the reefs at Flinders. (Slightly enlarged).

Fig. II.—The Common Pebble-crab, *Edania undecimspinos*, dredged on sand in two or three fathoms at St. Kilda. (Reduced).

Fig. III.—*Paramithrax minor*, a typical Spider-crab, with a masking covering of seaweed removed. (Natural size).

Fig. IV.—*Nectocarcinus integrifrons*, the Swimming-crab. Note the expanded dactyle, or claw, of the four pair of ambulatory legs, which, in the allied genera, become so paddle-shaped. (Natural size).

Fig. V.—*Heteropanope scrofulifrons*. Typical of the Xanthodae. This species is the common variety on the shores at Yarra Mouth and similar localities.

Fig. VI.—*Oyclograpsus audouinii*, characteristic of the Grapsidae or Square-fronted crabs—(a) eye; (b) front; (c) antero-lateral margin; (d) cheliped; (e) posterior margin. I-IV, ambulatory legs.

NEW VICTORIAN BEES.

New species and varieties of Australian bees are described in a paper by Professor T. D. A. Cockerell, published in *American Museum Novitates*, No. 346, April 27, 1929. Part I, deals with bees from the Northern Territory, mostly material collected by Mr. G. F. Hill; and Part II with bees from Victoria, New South Wales and Queensland, also New Britain.

Additions made to the Victorian list include the following.—

Colletes picta variety *wilsoni*, new variety—Eltham (F. E. Wilson).

Paracletes maximus, new species—Victoria (G. F. Hill).

Euryglossa albesignata, new species—Damawn (W. F. Hill).

Parasphocodes tripunctatus, new species—Ararat (G. F. Hill).

Halictus barretti, new species—Seymour (W. F. Hill). This species evidently is closely allied to a very remarkable Tasmanian bee, *H. mucrops* Cockerell, known only in the male.

Dr. Cockerell's paper is an important contribution to knowledge of the bee fauna of the Australasian region.

PARROT'S KEEN PERCEPTION.

A rosella parrot, which we have had for about nine years, usually answers when whistled to, and I noticed recently that the bird was remarkably prompt in responding, when I used as short and sharp a note as possible, and at very irregular intervals, his response, something between a whistle and a cluck, appeared to be almost simultaneous: (a response could not be simultaneous, but the interval of time was not perceptible to those present). The cage was covered with a cloth, and the bird could not see the person whistling. In similar conditions, a human being, using all his intelligence, could not equal this performance: in fact, the parrot's action appeared to be reflex, but must have been voluntary. He frequently "reports" my arrival home before the front door is opened.

W. H. INGRAM.

ANASPIDES IN LONDON.

Professor G. E. Nicholls, who is preparing a monograph on the Fresh-water Crustaceans of Australia, has succeeded in getting some specimens of *Anaspides* alive to London. They were exhibited at a meeting of the Zoological Society. This Tasmanian shrimp is a "living fossil," occurring abundantly in certain of the mountain streams, and has a very special interest for students of the crustacea. Attempts to bring it alive to Melbourne last year failed; yet it survived the voyage to England!

Sanctuary for Native Game, from *Government Gazette*, January 4, 1929:—The property known as "Grassmere," in the Parish of Berwick, consisting of 287 acres, intersected by the Cardinia Creek, has been proclaimed a sanctuary for native game.

NOTES ON THE NUDIBRANCHS (SEA-SLUGS).

By Julia A. Underhill.

What wonderful opportunities you have there in Australia in the field of collecting, classifying, and giving to the world unknown information. I envy the person who takes up the study of the Nudibranchiata in your surroundings. Perhaps someone of your people might become more interested if they knew how an amateur here, in the State of Washington, U.S.A., became interested and carried on her investigation in this field of biology.

One day, as I was rowing across an inland arm of Puget Sound (leaning over the side of the boat between each stroke of the oars, enjoying the ever-changing colour and life on the bottom), a little semi-transparent creature went snapping by. It was swimming with the help of appendages, bringing its head and tail together on one side, then, with a sweep, together on the other side. I nearly fell out of the boat in my excitement, but finally caught the creature and put it into a bucket of sea water in the boat. Upon reaching the laboratory, I placed it in a glass container, so that I might examine it more closely. Imagine my surprise when it changed from the transparent creature I had captured, and showed all the colours of a Mexican opal. It was the nudibranch, *McClube Leonini*. Right there my more than casual interest was awakened. I looked up all the books upon the subject which I could find, and discovered that there was no complete bibliography published.

The balance of the summer I spent hunting nudibranchs. The flat-bottomed, sixteen-row rowboat finally became equipped with two handled tea-strainers of small and large sizes, two dip-nets, one having a handle about two feet long, the other, five feet; the first had a balloon silk bag, the second, one of fine marquisette. For containers there were quart and pint Mason fruit-jars, a couple of buckets, and a small galvanized-covered garbage pail. It seemed like a great deal of equipment, but it stacked pretty well together, and while I might find only one tiny fairy-like creature, there was always the possibility of coming upon a real surprise in the form of a large *Triopha*. (Also, the person who starts to collect in one group finds so many interesting things to bring to the laboratory, that many containers are necessary.)

Careful handling is very necessary, as one does not, at first, know just which animals of this group can be safely carried in the same container. Some of these little creatures, if

irritated, strip off their beautifully coloured cerata, and when you reach home and examine them, you find, instead of the beautiful specimen which you had so carefully lifted into the boat, just a naked little slug. He does this in order to protect himself from his enemies, and it is a protection from you, for your first impulse is to dump him back into the sea from which you have taken him, and where he will soon regenerate his lost parts. It is therefore wise to have plenty of containers.

Here, in the north'and, nudibranchs are found on the surface seaweeds, under rocks, and in the shallow channels where the water flows swiftly as the tide goes out. Others are found on the piles of stationary docks; underneath the planking on the floating docks, and often on the blades of the giant kelps, quite a way beneath the surface. If one searches carefully,



Photo Julia A. Underhill.

A SEA-SLUG SWIMMING.

and with patience, he is rewarded by finding and identifying eight to ten families, and many species in each family; and if he wishes to go farther afield, there are the deep-sea species, found from ten to forty, or fifty metres below the surface. In this latter search, one must have not only equipment, but also the co-operation and assistance of others.

The dredging equipment used to secure some of my specimens consisted of a halibut boat (troller) sixty feet in length. In the stern cockpit was placed a Ford engine, which, in turn,

handled a drum, upon which was wound a thousand feet of steel cable. There were two dredges to be used with this cable, one large one, the framework of which measured about five by two and one-half feet; the smaller one, a foot and a half smaller each way. The balance of the dredges were made of closely-tied cord mesh, such as is used by the purse seiners, and were about six feet in length. Needless to say that we usually used the larger dredge.

Dredging is most interesting work, and is best done at low tide, but takes time, strength and patience. About eight dredges constitute a day's work, but students are lucky if they handle intelligently, four to six. Think of the excitement when the dredge appears at the surface, is swung on board, the rope which holds that great brimming net together at the bottom is untied, and the contents fall to the rack on the stern deck! A mass of algae, or crabs, which scuttle to the edge of the boat, and drop back into the sea, if they are not quickly caught; many-rayed starfish, sea cucumbers, and, perhaps, your prize of prizes, a choice nudibranch.

The wind rises, the water becomes too rough for dredging; the anchor is lifted and the captain is instructed to sail for a lone island or reef, which can be investigated only at low tide. Here you clamber into the boats and row to land, or, having wisely brought your swimming suit, you dive into the cool water, and soon swim ashore. Walking and slipping over wet rocks, your search continues. Underneath the rocks is your best chance, and so you call on your friends for help, and turn over the big ones. If fortunate, your efforts are rewarded with many nudibranchs.

Your interest may not be confined to this one group of animal life; if this be true, you will collect chitons, crypto-chitons, big blennies, keyhole limpets, nemertians, etc. When the whistle blows, recalling you to the ship, you bend low under the weight of your buckets, or will impose on some friend to assist you back to the boats. All safely aboard, the anchor is lifted, and *The Medea* chugs for home. But your labours are not yet completed.

Upon arrival, your specimens must be cared for. The best way to keep nudibranchs, I have found, is in a specially-made box, which can be kept in the water at the dock. They will not live long in the laboratory. This container is simply made, covered with very fine galvanised wire screen, and has several compartments. Specimens placed here will remain alive indefinitely, and may be removed to the laboratory for intensive study if desired.

The next day you may take, say, two exceedingly different nudibranchs to the laboratory for identification. For the beginner, the first thing to decide is whether his specimens belong to the Holohepatic or Cladohepatic group. The former of these has the liver in a compact mass in the centre of the animal; the latter has a many-branched liver, parts of which extend out into the naked gills, or cerata. From this point, he will take his animal part by part and check with the descriptions given him in some of his reference books. He need not be surprised if he comes upon a species not yet described, for there has been comparatively little work done in this group. He must be very careful, though, in deciding that he has a new species, for mistakes made add to the work and general confusion, when others working in the same group try to check up. Careful sketches should be made, or, perhaps the student will wish to make photographic studies. This is a difficult thing, but it can be done.

The equipment should consist of, preferably, a 5 x 7 view camera, with a 24in. bellows extension, a good Bausch and Lomb double anastigmat lens of about 8½in. focal length, mounted in any good shutter; a solid, rigid tripod (No. 3), equipped with a tilting tripod top and tripod brace for photographing with the camera in a vertical position.

Photographing specimens through water gives troublesome reflections, which can be remedied with a piece of black velvet about 14 inches square in front of the camera, allowing only the necessary opening for the lenses. It might be better to photograph specimens one-half to one-quarter their natural size, and then enlarge from the negative. Use small diaphragms (32 to 45) and strong light. Sunlight is best, I believe. Exposure of 1/10th to 1/15th of a second (sometimes much faster, for some of these specimens are in constant and swift movement). Flashlight power can be used, but it means time, patience and much experimentation to secure results. Panchromatic plates and a light filter are almost necessary on account of the many colours, including reds, in your specimens.

I trust that there may be something in these pages which may help interest someone there to take up the study of this group. What wonderful opportunities there are there for the right person!

(The author of this article is an American naturalist, who has made a special study of the nudibranchs. The group has been neglected by nearly all our conchologists, and a worker in the Australian field is assured of a rich harvest.—Editor.)

CONCERNING CRANE FLIES.

By F. E. Wilson, F.E.S.

Possibly no group of insects has received less attention in this country than the Crane Flies, or *Tipulidae*—the "Daddy Longlegs" of our childhood days. The family is undoubtedly well represented in Australia, although our knowledge as to their distribution is, as yet, very imperfect. This state of affairs is due largely to their unpopularity with collectors, by reason of their great fragility, and also because so many of them are small and of unattractive appearance. Nevertheless, they are insects of great interest, that well repay time devoted to their study.

At certain periods of the year some species of *Tipulidae* possibly outnumber all other insects combined, in favoured localities, and from this point alone they merit our attention. Up to the year 1889 only 21 valid species of Crane Flies had been described from Australia, although a tremendous amount of work had been done amongst other groups of our insects. In that year, Frederick Skuse, then entomologist to the Australian Museum, Sydney, published a lengthy paper on the family in *Proceedings of the Linnean Society of N.S.W.* In this paper over 70 new species were described, and at a later date others were added, bringing his total of new species up to nearly 100. Most of Skuse's species were secured from the neighbourhood of Sydney, some odd examples only being recorded from other States.

Interest in Crane Flies again languished until comparatively recently. Then the late Dr. E. W. Ferguson began to accumulate material, again mainly from New South Wales, and G. H. Hardy did a little collecting in Tasmania. About this time, Dr. C. P. Alexander, of U.S.A., the world's authority on *Tipulidae*, became interested in our Crane Fly fauna, and immediately there was an awakening of interest in this, the Cinderella group of Australian Diptera. Mr. A. Tonnoir, passing through Australia on his way to New Zealand, collected a considerable amount of material in Tasmania, and in our Dandenong Ranges, and mostly everything he obtained proved to be new. The genus *Tonnoiromyia*, erected by Dr. Alexander to contain some graceful little flies belonging to the family, will always associate this collector's name with our Crane Flies.

At present our "Daddys" are grouped under 55 genera, and although I am not sure as to the exact number so far described, it must already greatly exceed 300 species. Very

little is known as to the life histories of our Australian forms, and there is a vast field of research open to the entomologist with time and facilities for such work. Some species are undoubtedly aquatic in their larval stages, but most of them appear to live in moist earth, mosses, and vegetable debris. One of our commonest species around Melbourne, *Habromastix hilli*, Alex, named after Mr. Gerald F. Hill, of the Commonwealth Bureau of Entomology, favours well-watered lawns for the earlier stages of its life history. Occasionally this species may be seen emerging in large numbers in suburban gardens.

Rather remarkable is the fact that sometimes, although thousands of examples of a given species may be on the wing, practically every example will, upon examination, be found to be of the one sex. Whether this is a provision of Nature to act as a check upon the multiplication of the species or not, I cannot say, but, nevertheless, it is a fact that I have established on more than one occasion. To see the number of eggs that one female is capable of laying, impresses one that some check is certainly necessary.

Crane Flies, as already stated, are very delicate insects, and, unless handled with extreme care, their legs drop off, and this makes them unsightly objects. It is, no doubt, mainly for this reason that collectors have paid such scant attention to our species. Should several specimens be placed in the killing bottle and carried home therein, the result is, generally, a mass of loose legs, antennae, and bodies. The flies die very quickly in the cyanide bottle, from which they should be immediately transferred to insect envelopes, in which they carry quite well. Should, however, a leg or two become detached, it is then possible to assign it to the correct specimen. The smaller species I usually place singly, whilst alive, in gelatine capsules, and almost invariably they are dead and ready for mounting by the time I reach home.

In many genera, for purposes of determination, it is necessary to examine the sexual organs of the male, a microscopic slide having to be made for the purpose. Consequently, when carding specimens, the tip of the abdomen should always be left free, so that it can easily be removed if necessary.

You may look for "Daddies," with more or less success, from sea level to the tops of the highest mountains, but you will be most successful in your search at the higher elevations. Whilst the brackish, swampy areas at sea level undoubtedly harbour many species, the dark fern gullies of the

ranges, and the boggy sphagnum patches of the high plains, are the ideal hunting-grounds for the *Tipulid* seeker. Wherever tree-ferns grow, there will the *Tipulid* fauna be found exceedingly rich. This fact was impressed very strongly upon me when collecting in the Grampians last November. Four or five days' wandering amongst the hills had not been very productive, so far as Crane Flies were concerned. Then a day was spent in the valley above the Silver Band Falls, where tree-ferns grew in profusion, and a wonderful haul was made, which included several very interesting forms.

When one begins to ascend the high country, a few hundred feet of altitude will often supply an almost totally different Crane Fly representation. Many of the larger forms of *Tipulidae*, such as *Macromastix*, *Clytocosmus*, *Platyphasia*, *Plusiomyia*, etc., are, of course, easily detected during a bush ramble, but the smaller types, such as *Limnophila*, *Molophilus*, etc., are very often overlooked, although possibly present in considerable numbers. I have been most successful in my search for these, by sweeping with the net in likely places. Grasses and other herbage growing beside damp drains, margins of ponds, and beside running streams, often are very productive. Mostly the insects are not seen until an examination of the net is made. Sweeping the under-surface of tree-fern fronds often produces specialised species, and many may be disturbed by agitating the masses of dead fronds that usually encircle the fern trunks. A net passed lightly over the surface of wet, moss-begirt rocks and cliff faces, will sometimes bring to light specimens that otherwise probably would not be detected. Occasionally Crane Flies are attracted to lights, but not so frequently as one would expect.

A charming sight that may be sometimes witnessed is the graceful dancing flight of the smaller species. Not all Crane Flies appear to have this habit, but it seems to be rather prevalent with the genus *Limnophila*. A swarm of, possibly 50 or more flies, moving in close formation, alternately rising and falling, but not necessarily in unison, is the sight that meets the eye. Occasionally some will drop out and rest momentarily on a nearby fern frond, to join again later in the mad dance. This proceeding goes on for quite a considerable time, yet the swarm seems to be almost stationary in a few cubic yards of air. 'Tis somewhat difficult to picture, but a most entrancing scene to watch.

Many species are on the wing only for brief periods, and while common one week, may be missing completely when the

same locality is visited two or three weeks later. It is thus apparent that, to gain an idea of the *Tipulid* fauna of a particular district, or single gully even, it is necessary to collect over the ground at fairly regular intervals throughout the year. Crane Flies are on the wing in all seasons, and under almost all weather conditions. Some species appear to be extremely local, and to go 50 or 100 yards away from their habitat, is to get completely out of their terrain. These statements will serve to indicate what a vast amount of careful collecting still remains to be done, before we can have a fairly complete knowledge of the range of species inhabiting our continent. There is urgent need for more investigators in the *Tipulid* field.

When, about two years ago, Dr. Alexander wrote and asked me to save any Crane Flies that I came across on my collecting trips, my knowledge of the family was practically nil. I was certainly familiar with a few of the common, big, showy species, as any observant Rambler must be, but I had not the slightest idea that so many forms were to be found in our bush country. The devotion of a portion of the time to the gathering of "Daddies" on each collecting trip, has resulted in well over 60 new species being brought to light. I have no doubt that there still remain many new forms to be located, even close to our metropolis. The Belgrave district alone is an extremely rich field, that has, as yet, been but imperfectly worked.

Curiously enough, a habit of Crane Flies, which, on more than one occasion, I observed when a boy in the Beaconsfield district, has never come under my notice since I have been paying particular attention to the family. This is where a considerable number of individuals swarm in a hollow log, stump, or rabbit burrow. They cling close together, much as do swarming bees when they settle in a mass. Should any other member of our Club witness such an occurrence, I should be very glad to receive a few of the flies, for purposes of determination.

One of the most remarkable of our Crane Flies is *Clytosmus edwardsi*, Alex., a very robust insect, that I find on the wing generally during March and April. It is a striking fellow—jet black, white and orange in colour, with opaque orange-coloured wings. Three females before me have a thorax of rich orange tint, while a male has one of black and white coloration. It is an insect that most people would hesitate to associate with the flimsy-bodied Crane Flies. This species, together with two others not found in Victoria, Dr.

Alexander considers to be the finest Crane Flies in the world. A good locality for *Clytocosmus* is the timber tram-track at Millgrove, just below the Dee River bridge. Its flight is rather laboured, and, on one or two occasions, I have seen it ascend to a height of about 20 or 30 feet, and circle for a considerable time. When flying, it resembles more one of the large yellow and black Pompilid wasps than a Crane Fly.

One of our handsomest Tipulids is *Ischnotoma par*, Walker, with its yellow body, banded with black, and strongly outlined wing venation. In my experience, it is not particularly common, but I have records of it from Millgrove, Clarkefield, and the Otway Forest. At Millgrove, we usually disturbed them from amongst bracken fern, where they were resting, either singly or in mated couples. Instead of just flying away over the bracken tops when flushed, they almost invariably rose vertically 20 or 30 feet, until they found a resting-place among the eucalypt leaves. The same habit I also observed with an allied species, *I. serripennis*, Macq., in the Kinglake district. The latter species, which may be sometimes taken at Ferntree Gully, is also a lover of alpine country, two examples occurring to me when collecting on the Bogong High Plains. In each instance, I found them resting on wet, moss-covered stones, adjacent to a waterfall; and as both were females, it is highly probable that their eggs are laid in such situations. Specimens taken in the Grampians, and others at Kinglake, were, in each instance, captured close to waterfalls.

A delightful genus is *Gynoplistia*, and one of which a considerable number of species occur in this State. They are, mainly, brightly coloured flies, often with more or less mottled wings, and with beautiful flabellated antennae. *G. bella*, Walker, one of our earliest described Tipulidae, is perhaps the best known of them, as it is a widely-distributed insect. Its body is yellow, tipped with black, and its wings are heavily mottled with black. It may sometimes be found upon the flowers of *Bursaria spinosa*, but whether it sips nectar or not, I cannot say. I found it to be particularly numerous on the creek at Clarkefield upon the occasion of the last Field Naturalists' Club excursion to that district. Another fine species, although less brightly coloured, is *G. wilsonella*, Alex. M.S., which I captured in some numbers at Hall's Gap, in the Grampians, during November last. One of the smallest and most drab-looking members of the genus, was discovered in the Traralgon district by our Club member, Miss Jean Galbraith, and named in her honour by Dr. Alexander.

The genus, *Molophilus*, is, from the point of number of species, one of our most important genera, and, so far, nearly 50 different kinds have been recorded from Victoria. Practically all of them are dingey-looking flies of small size, and with strongly fringed wings. Although many of the species greatly resemble one another, an examination of their Hypogea reveals strongly marked differences. They are a group in which expert knowledge is required for their determination. The genus is also fairly well represented in Southern South America. By far the most beautiful *Molophilus* I have seen is one I captured last February on the Bencairn-Donna Buang Road. Several examples were swept from fern fronds at the head of a beech gully. With their black and white ringed legs, black thorax, and whitish body and wings, they constitute one of the most distinctive *Molophili* known. This little gem is being described by Dr. Alexander as *M. titanea*, his inspiration for the name having come from Spencer's "Faery Queen."

The largest Tipulid we get here is *Semnotes imperatoris*, Westw., a veritable giant, and, in my experience, a rare insect. I have seen it only on two occasions, once at Belgrave, and again at Millgrove, and so far have not succeeded in netting a specimen. Another Crane Fly of considerable wing spread, but of much more graceful build, is *Plusiomysia olliffi*, Skuse. It is a greyish-looking fly, with darkish wings, relieved with large white patches, and with particularly long legs. I have taken it at Ferntree Gully and also on the Bogong High Plains, so that it enjoys a wide range of habitat.

Two Crane Flies might be mentioned that are characterised by remarkable antennae. Of these, by far the commonest is *Macromastix costata*, Swell., in which the antennae are over four times the length of the body, giving it the appearance of having eight legs. Two seasons ago there was an eruption of these "Daddies" at Boronia, where the countryside seemed to be moving with them. The other species is *Stibadocerodes tasmanensis*, Alex., in which the long antennae are plumose throughout their entire length. This fly is a lover of dark, moist gullies, and I have taken it at Belgrave, Marysville, and in the Cumberland Valley.

Another charming Crane Fly that also favours the dark recesses of the fern gullies is *Austrolimnophila pristina*, Alex., a large dark insect, with beautifully mottled wings. When flying, it seems to harmonise with its surroundings, and is most difficult to follow. On more than one occasion I have

disturbed them from the moss and fern bedecked trunks of tree-ferns. Personally, I consider this the finest Crane Fly known to me; but, of course, tastes differ.

One cannot dismiss the subject of Crane Flies without commenting upon the genus *Macromastix*. Generally, when they are upon the wing, everybody knows it, for they appear in countless thousands. So plentiful are some species at times, that I have known occasions when three or four sweeps with the net would secure a full-sized breakfast cup of closely-packed individuals. *Humilis*, Skuse, and *fergusoni*, Alex., are probably the most common forms met with near Melbourne. A beautiful species, that I obtained at Eltham last year, early in April, has been named *luteisubcostata* by Alexander. Visiting the same locality this year, but three weeks later in the season, a whole afternoon's searching only provided me with a single example, although, previously, the species had been plentiful. Recently, Mr. J. Clark collected a fine new species in Eastern Gippsland.

There are numbers of other genera of Crane Flies that one could write about did space permit, but I think I have mentioned enough to show that these insects furnish a most interesting field for collecting and research. I must confess that I entered upon the gathering of Tipulidae with no great enthusiasm, but the charm of the "Daddies" fast takes hold of one, and acts as a spur to greater activity in the collecting field.

TREE-CREEPER'S SLEEPING QUARTERS.

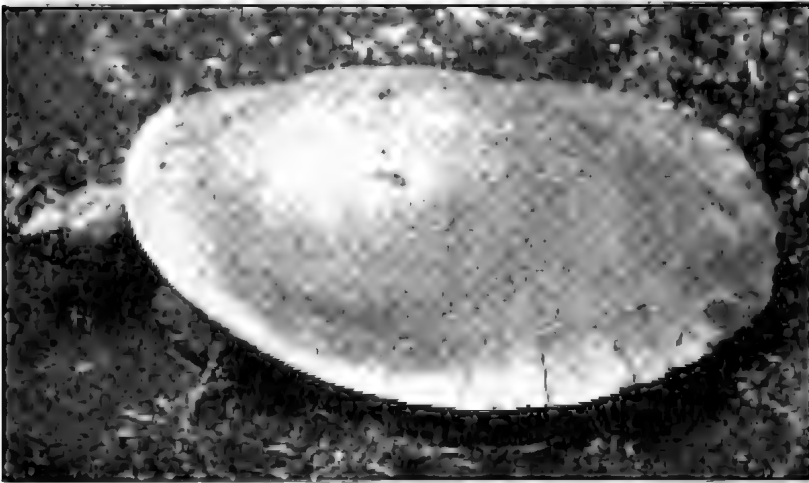
For the fourth year in succession, a Brown Tree-creeper, *Climacteris candens*, has taken up sleeping quarters under the verandah of my house, at South Warrandyte. From the colour, the bird appears to be a male. On his first appearance he selected a spot on the weatherboards, immediately above the front door, but in the following and third years, chose a corner position nearby. He appears about the end of March in each year, and takes his departure early in September. His return each evening at dusk is heralded by several sharp notes, and if any person is moving about near the door, the bird hovers round for a few minutes before going to his accustomed perch. His departure in the morning is announced in the same manner; during July the time has been about 7.15 p.m.

When he has once settled down for the night, nothing disturbs the Tree-creeper, and I have frequently had a torchlight focussed on him for some time while showing visitors his resting place. The boards of the house are of hardwood, stained and varnished, and it is a mystery to me how he manages to cling to them, and remain in the position all night. I noticed one night that one of his feet was not under his body, but was extended at an angle away from him—the other foot was towards the corner, and I could not see it. Perhaps some of the Club's ornithologists may be able to explain what faculty the bird possesses to enable it to cling to a hard, smooth surface. J. E. O.

THE MURRAY TORTOISE.

As a garden pet, the Murray Tortoise, *Emydura Macquarii* Gray, is familiar to many people who have never seen the species in its natural haunts. And commonly it is called "turtle," a usage often defended by owners of these reptiles, despite the plain evidence of "walking" feet! In many Melbourne gardens tortoises are kept; and, since they are inclined to wander, we get records of the occurrence of *Macquarii* in the most unlikely spots. Several reports of the kind have recently been made, the latest coming from Caulfield.

For nearly a year my wildflower patch, enclosed with wire netting, has been the home of a Murray Tortoise, captured out Footscray way. "Jimmy" is happy in his little realm. He has formed tracks among the plants, has sleeping



quarters beneath a clump of rainbow fern, and enjoys the pleasure of a pool when he's so disposed; he takes food, of course, in the water.

During the winter my tortoise makes rare appearances; a sunshine morning lures him from cover, and, at the accustomed place, by the gate, he waits for a meal—raw meat, chopped small, and softened. He is tame as you please, and seems to distinguish my wife, who always feeds him, from other members of the family. He may not be "brainy," but certainly shows signs of intelligence.

In the Murray and its tributaries, and in some lakes and lagoons of the great river basin, *E. Macquarii* is very abundant. One summer, when bird observing at Lake Boga, I observed hundreds of "mud turtles" in the warm, shallow waters of the lake, and found nests in sand or dry ground near the shore and many yards away. So plentiful were tortoise nurseries, that boys had collected quantities of the eggs, and were pelting one another with them!

Faint tracks from the water's edge were followed, in one case, for 200 yards; in another, for 50, to the sites of tortoise nests. The number of eggs to a "clutch" varied from nine or ten to fifteen; they were white, and soft-shelled, and, as a rule, not deeply buried. It is easy to scrape open a Murray Tortoise burrow, though not so easy to locate it, unless freshly made.

I watched a tortoise at work, scraping, near the Swallow Cliff, a hole in the sand which later contained eggs carefully covered over.

At this season—October-November—the sun-warmed waters of Boga, near the Swallow Cliffs especially, were so well stocked that the tortoises formed jostling crowds close inshore. Many were leaving the water in quest of nesting sites; scores were returning from inland excursions. The reptiles were busy with their home-making, and in the low cliff, round which they wandered, white-backed swallows, *Cheramoeca leucosternum*, were nesting. To and from their burrows and far over the lake the birds were flying, as indifferent to the tortoises as the latter were to them.

C. BARRETT.

WINTER SWALLOWS.

On the morning of July 13 great numbers of Swallows (*Hirundo neoxena*) were observed fluttering a few feet above the lake at Albert Park, and occasionally dipping to the surface; many more were perched on the concrete margin or flying over the grass. It was impossible even to guess at their numbers, but they must have been in thousands. Looked at low across the water, the birds appeared, at a distance, as a distinct, dark, misty band. They were only around and over the southern half of the lake, the northern half being occupied by numerous seagulls.

On the previous Sunday the swallows were observed in large numbers around the northern end of the lake, but only a few were over the water. From the park they extended into the streets, nearly up to St. Kilda-road. It is known that the Welcome Swallow is partly migratory, and the question is: Are these large flocks parties of late migrants, or are they wintering birds, banded together on account of supplies of food becoming available in certain localities?

A.E.R.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, August 12, 1929. Mr. C. Barrett (Vice-President) occupied the chair, and there were about 120 members and visitors present.

The Chairman alluded feelingly to the death of Sir Baldwin Spencer, and called on members to stand, as a mark of respect to his memory.

CORRESPONDENCE.

From Sir Douglas Mawson, thanking the Club for the good wishes sent to him in connection with his forthcoming Antarctic Expedition.

From the Council for Scientific and Industrial Research, regarding grants to research workers, and drawing attention to an advertisement of the position of draughtsman and artist in connection with entomological investigations.

From Government Tourist Bureau, regarding proposed Nature Study Camp in the Grampians in September.

From Lady Spencer, acknowledging a letter of sympathy from the Club in connection with the death of Sir Baldwin Spencer.

REPORTS.

Reports of excursions were given as follows:—National Museum, Fossils, Mr. F. Chapman, A.L.S.; Belgrave, Lyre-birds, Mr. W. H. Ingram.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—Miss M. Cook, Glen Iris; Miss Hyslop, Malvern; Mr. D. B. Adams, Burnley; Mr. H. Jenkins, Heidelberg, as ordinary members. Miss M. Robertson, Elsternwick, as associate member.

GENERAL.

Ethnological Section.—It was intimated that the Committee had decided that the holding of separate meetings by the Section was not desirable, but that ethnological subjects would be included in the lectures at the monthly meetings of the Club as circumstances permitted. Ethnological exhibits, with comments thereon, would be welcome at any Club meeting.

LECTURES.

Miss J. C. Cookson, B.Sc., gave an interesting lecture on Ancient Plants, chiefly of the Silurian and Devonian Ages, illustrated by specimens and lantern slides of photographs and drawings of fossil plants. Mr. F. Chapman, A.L.S., spoke on some Extinct Plants of Later Horizons. His talk was illustrated by lantern slides of drawings of fossils and restorations of the forest vegetation of the Coal Age.

EXHIBITS.

By Mr. F. A. Cudmore.—Fossil Plants from Upper Carboniferous of Radstock, Somersetshire, England; Fossil Leaves from below Linda Falls, Letra, Blue Mountains (Carboniferous); Fossil Plants from Narrabeen, north of Sydney (Trias-Jura).

By Mr. F. G. A. Barnard.—Growing plant of Moonwort, *Botrychium australe*, obtained at Oakleigh, September, 1887 (its forty-second season).

By Mr. A. E. Opperman.—Growing plant of Moonwort, *Botrychium australe*, obtained at Lysterfield, September, 1928.

By Mr. G. J. Gabriel.—Marine Shells: *Umbraculum cori-
natis* Tate, Victoria; *U. sinicum* Gmel., Mauritius.

By Mr. V. H. Miller.—Aboriginal axe, from Trentham.

By Mr. A. Mattingley.—Aboriginal stone axe-head, found at Altona last week-end.

By Dr. H. Flecker.—Skiagrams of (a) *Ophidiroids* and (b) *Aplysia*, from specimens collected at Altona by Mr. A. C. Nilson.

By Mr. W. Hanks.—Graptolite, *Monograptus colonis* Bar-
raude var. *compactus* Wood, in blue mudstone, the first from
Coburg.

By Mr. F. Chapman, A.L.S.—Specimens of Fossil Plants
by courtesy of Director of the National Museum—Car-
boniferous—*Lepidodendron*; *Sagenaria*; *Calamites*; *Neuro-
pteris*; *Alathopteris*; *Sphenopteris*; *Pecopteris*; from the coal
measures of Prussia. Coalite—*Taeniopteris*, Nilssonia; York
shire, England. *Lepidodendron Veltheimianum*; Car-
boniferous of Mansfield, Victoria. *Lepidodendron australe*;
Star Beds, Drummond Range, Queensland. PERMOCAR-
BONIFEROUS—*Glossopteris Browniana*; from Mersey River,
Tasmania.

By Dr. C. S. Sutton.—Capsules of *Eucalyptus Haemaphysa*
and *E. pyriformis*, illustrating extreme difference in size.

By Mr. C. Borch.—Case of Butterflies, Wood-brown species.

By Miss I. Cookson.—Fossils illustrating her lecture.

By Mr. E. E. Pescotti, F.L.S.—Flowering sprays of *Thryps-
tumea calycina*, from his garden.

By Mr. S. R. Mitchell.—Boat-building adze, from Pura Village, near the confluence of the Fly and Strickland Rivers, Papua, showing what can be called the socket-hole method of hafting a stone implement. Several strong adzes of a very simple type that have been fashioned by grinding a cutting edge on one end of long, flat river pebbles.

NATURE TRAILS.

Five years ago a happy thought occurred to Dr. Frank E. Lutz, curator of the Department of Insect Life in the American Museum of Natural History, New York. This was to form a Nature Trail near the city in some tract of land or sanctuary that was kept in as nearly natural a condition as possible, and where people, when out of doors, could be told about nature, and could see living specimens in natural environments.

The experiment was tried of marking out two Nature Trails in the Harriman State Park, Tuxedo, New York. These trails were roughly circular, and about 18 inches wide, and half-a-mile in length. One was called the "Training Trail," the other the "Testing Trail." On the first a few of "the easy and most interesting things, especially those concerning which there is popular misinformation," were picked out—the way of the bird, beast or insect, a rock formation, the growth of a plant, flower or a seed, the enemies of plant life, the denizens of a swamp, a brook or a stream, etc., etc. These items were selected and labelled appropriately. The underlying idea, "the spirit of the Training Trail," was "that a friend is taking a walk with you and pointing out interesting things."

On the "Testing Trail" there were no informative labels, but the visitor was supplied with 50 numbered questions about the plants and the insects, along the trail. He could write the answers, and have their correctness tested by an official, or test them himself at the end of the trail by comparison with the answers posted up for the purpose. The Trails were placed so that they might be easy of access to motoring people, but especially to those from the towns or city in camps, in which thousands of children every summer are resident, each for a week or more.

In three continents the movement has spread, giving zeal and a new outlook to camping excursions. Why should such a commendable project not be instituted in Australia under similar conditions? In Victoria, Wilson's Promontory, Sassafras, the Dandenong Reserve, the State forests and similar areas suggest themselves as suitable for the purpose or even Studley Park, Wattle Park and Royal Park, close at hand. Lectures about nature, museums, and articles in books and magazines are all helpful, but with Nature Trails the great advantage is that things are seen and at first hand, out-of-doors, studied, and information given about them can be practically verified.

CHAS. DALEY.

A NEW GREENHOOD ORCHID.

By (MRS.) E. COLEMAN.

Pterostylis Rogerisii COLEMAN, n. sp.

Planta terrestris 10-20 cm. alta robustior quam *P. reflexa* R. Br. Caulis papillosus. Folia basilaria (rosulata) absentia dum planta floreat. Folia caulina 4-7 alternata lanceolata pene-transparentia basi amplexicaulia, infima bracteosa, superiora ad 5 cm. longa. Flos solitarius translucens albus vel vitreus, perianthi segmentis columna atque labello rubide-striatis. Galea circa 4 cm. longa, ejus segmentis sub-aequale-longis paullo sed non abrupte curvatis. Labium inferius erectum sinu acuto, lobi 5-6 cm. longi in erectos filiformes apices galeam superantes producti. Label- lum ungui irritabili valide recurvum apice aliquando circinato per sinum protrudente, lamina supra canaliculata circa 2 cm. longa, linea elevata longitudinalis in medio ad apicem longum teres saepe emarginatum vel truncatum, marginibus anterioribus breviter ciliatis, appendice basali obscure 3-lobato penicillato valide recurvato. Columna erecta, alae angulo superiori in brevem erectam obtusam dentem producto, vix altiore quam anthera, lobus inferior elongatus oblongo-obtusius marginibus ciliatis. Stigma in columnae medio culeita-forme elongatum oblongo-ovale vel ellipticum.

W.A.—Bunbury and Collic, Miss Iris Banks, July, 1929; Busselton, Rev. E. Bryant, June, 1928, and July, 1929. Col. B. T. Goadby, July, 1929.

Plant terrestrial, 10-20 cm. high, of stouter habit than *P. reflexa* R.Br. Stem papillose. Radical leaves not present at time of flowering; stem-leaves 4-7 alternate, lanceolate, semi-patent, clasping at the base, bract-like below, up to 5 cm. above. Flower solitary, translucent white or grey, with rufous stripes on perianth segments column and labellum. Galea about 4 cm. long, the three segments sub-equal, slightly but not abruptly curved. Lower lip erect, sinus acute; lobes 5-6 cm. long, produced into erect filiform points embracing the galea. Labellum on an irritable claw, markedly recurved, tip sometimes circinate, protruding through the sinus; lamina channelled above, about 2 cm. long, a raised longitudinal line traversing the centre tapering to a long, obtuse point, the apex usually emarginate or truncate, its anterior margins shortly ciliate; basal appendage obscurely three-lobed, penicillate, markedly recurved. Column erect; upper angle of wing produced into a short, erect, obtuse tooth, scarcely higher than the anther; lower

Plate V.



P. Rogersii, C'olem.

P. revoluta, H.Br.

P. reftera, R.Br.

A Typical Specimen from N.Z.W.

lobe elongated oblong-obtuse, margins fringed. Stigma in centre of column, cushion-shape, elongated oblong-oval, or elliptical.

Realizing the very great classificatory value of herbarium material, I have based the separation of this species on such characters as are apparent in dried specimens, features which appear to be constant. Somewhat resembling *P. reflexa*, R.Br. and *P. revoluta*, R.Br. externally, it differs from both in important features, i.e., the upright habit of the floral parts, the length and shape of the galea, particularly of the dorsal sepal; in the greater length and shape of the labellum, in the position and shape of the stigma and column wings; in the acute sinus between the lobes of the lower lip, and in the vegetative leaves.

In *P. reflexa* the lamina of the labellum gradually narrows to an acute point. That of *P. revoluta* is acute, but shorter. Benthams found difficulty in separating these two species and grouped them together. Mueller evidently followed his example. Fitzgerald's A is generally accepted as the plant from which Brown wrote his description of *P. reflexa*. His specimens came from Port Jackson.

The new species is both abundant and beautiful. For this reason, I think it should bear the name of Dr. R. S. Rogers, M.A., M.D., F.L.S., who has done such fine work on Australian orchids, and who has been so generous in assisting other workers in the same field, both in Victoria and the other States.

For my specimens of *P. Rogersii* I am indebted to Miss Iris Banks, of Bunbury; Colonel B. T. Goadly, of Cottesloe, and the Rev. E. Bryant, of Busselton. I am also indebted to Mrs. Edith Rich, of Rushworth, Victoria, for specimens of *P. revoluta*, and to Rev. H. M. R. Rupp, of Paterson, N.S.W., for specimens of the type form of *P. reflexa*, for comparison.

The type of *P. Rogersii* is in the National Herbarium, Melbourne.

IN Victoria, as elsewhere, specimens of freak flowers are not altogether uncommon. But such an abnormality as I found on August 25, 1929, at Greensborough, Victoria, is worth recording. This was a Greenhood Orchid (*Pterostylis concinna*, R.Br.). Normal as regard size and colour, but with three lateral sepals, three lateral, or paired, petals, three column wings and two bracts instead of the usual solitary uppermost bract.—W. H. NICHOLLS.

SIR BALDWIN SPENCER, K.C.M.G., F.R.S.

The death of Sir Baldwin Spencer has deprived Australia of one of her most widely known and distinguished scientists, and our club of one of the most highly respected of its members. His death, due to heart failure, occurred on July 14, at Ushuaia, in the extreme south of Patagonia, while he was pursuing his anthropological researches among the primitive inhabitants of that remote country.

Born at Strötford, Lancashire, England, in 1860, Baldwin Spencer was educated at Owens College, Manchester, where he won the Dalton Prize for Botany and Comparative Anatomy. He was elected to the open science scholarship at Exeter College, Oxford, in 1881, and gained his B.A. degree, with first-class honours, in Natural Science. In 1885 he was appointed assistant to the Linnean Professor of Human and Comparative Anatomy at Oxford, and in the same year was elected a Fellow of the Lincoln College. He was appointed Professor of Biology at the Melbourne University in 1887, and held that position, with marked distinction, until 1919, and in the following year was appointed Emeritus Professor.

Immediately following his arrival in Melbourne his activities became apparent. The Biology School, with which his name will always be associated, was built to his own design. On July 14th, 1887, he was elected a member of the Royal Society of Victoria, and in the same year contributed his first paper, *The Anatomy of Mayascolides australis*, which formed the first article published in the new series of *Transactions* issued by the Society. In March of the following year he was elected a member of the Council, and immediately entered into the work of the Society with enthusiasm. From 1889-1898 he filled the position of Honorary Secretary, editing the publications and taking a leading part in all work associated with the Society. The scope of his activities was wide, and he was able to bring to bear on scientific matters a well-trained and keen intellect and a high capacity for original research. He was very popular, and soon became known to every worker, taking a personal interest in their investigations, and never too busy to give advice, assistance and encouragement.

Through his influence the membership of the Society was noticeably increased and the scope of research broadened. He was elected President of the Society in 1904, and was also a Trustee. He contributed numerous articles on biological and other subjects, all of which bear evidence of that degree of thoroughness and attention to detail which was so characteristic of all his work.

He became a member of the Field Naturalists' Club in August, 1887, and throughout the whole of his 42 years' association with the Club his interest never waned. For many years he attended the meetings regularly, and took a prominent part in its activities. He was particularly interested in field work, and took part in many excursions. He was one of a party of Field Naturalists which, in November, 1887, visited King Island—at that time but little known and sparsely settled. Notwithstanding the difficulties encountered, the greater part of the island was explored, and a fairly complete census of the fauna and flora recorded.

Professor Spencer also took an active part in an expedition through Croajingalong in December, 1888, in company with Messrs. C. French, D. Best, C. Frost and J. Searle, and wrote an extremely interesting and lengthy narrative of the trip. This was published in the *Victorian Naturalist* (Vol. VI., 1889), together with several of his own sketches—the first illustrations to appear in the Club's journal. This trip occupied about three weeks, and embraced a tramp of more than 300 miles on foot through one of the wildest and finest parts of Victoria. Again, in November, 1890, he was one of a party to explore the then little known country from Marysville and Woods Point to the Yarra Falls. Details of all these expeditions were recorded in the *Naturalist*, and added considerably to a knowledge of these remote districts.

He was President of the Club from 1891-93, and again in 1895-7; and only a few days before the sad news of his death was announced he was elected an Honorary Life Member. His lectureries were always full of interest and the subjects well chosen. Among the papers read at the meetings may be mentioned:—

1892.—A Trip to Newcastle in Search of *Ceratodus* (Vol. IX., p. 16).

1895.—Collecting Notes from Central Australia (Vol. XI., p. 158).

1895.—Preliminary Description of a New Species of *Apus* (Vol. XI., p. 161).

1899.—Remarks on a Rare Marsupial (Vol. XVI., p. 105).

1906.—The King Island Emu (Vol. XXIII., p. 139).

1918.—What is Nardoo? (Vol. XXXV., p. 8).

1918.—Kitchen Middens and Native Ovens (Vol. XXXV., p. 113).

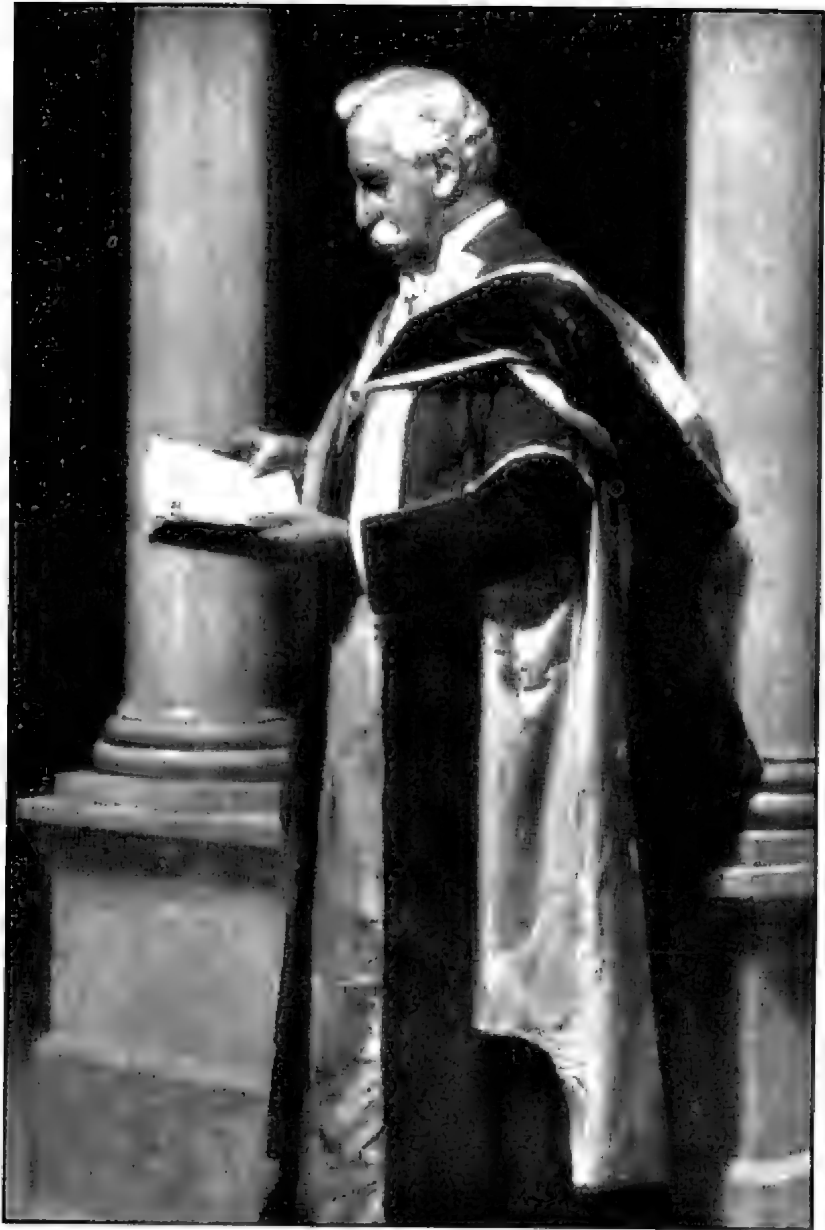
1920.—The Necessity for an Immediate and Co-ordinated Investigation into the Land and Fresh-water Fauna of Australia and Tasmania (Vol. XXXVII., p. 120).

He also wrote memorial notices concerning Baron Sir Ferd. von. Mueller (Vol. XIV., p. 87); Dr. A. W. Howitt, C.M.G. (Vol. XXIV., p. 181); Dr. T. S. Hall (Vol. XXXII., p. 129); G. A. Kearnland (Vol. XLII., p. 48).

Included among his activities, prominence must be given to the part he took in securing the permanent reservation of Wilson's Promontory as a National Park and Sanctuary for the native fauna and flora. The proposal originated with the Field Naturalists' Club, and was strongly supported by the Royal Society and other prominent public bodies, and after many years of striving with successive Governments, only portion of the Promontory had been reserved, and that temporarily. Sir Baldwin (then Professor) Spencer was appealed to, and at once gave to it his whole-hearted support. A public meeting representative of the various Societies and bodies interested was held, followed by strong representations being placed before the Government, with the result that the whole of the Promontory was permanently reserved and vested in a Committee of Management, of which Sir Baldwin Spencer was Chairman from its inception until his death.

The Professor joined the Horn Expedition to Central Australia, which left Adelaide in May, 1894, and was one of its most active members. More than three months were spent in the field and some 2000 miles of the interior traversed, for the most part on camels. In addition to undertaking charge of the Zoological and Photographic sections and editing the Reports of the Expedition, he dealt with the Mammalia, Amphibia and Crustacea, and described several new species. He also wrote the Narrative and a Summary of the Zoological, Botanical and Geological results. In the Zoological section 602 species and 398 genera were dealt with, of which 171 new species were described, while most of the excellent illustrations were reproduced from his own drawings. In the following year, good rain having fallen, he again visited the same district and added considerably to the collections previously made.

As a result of these trips and his friendship with the late F. J. Gillen, he became interested in Anthropology. In conjunction with Mr. Gillen, he undertook an ethnological expedition through Central Australia to Darwin and thence to the Gulf of Carpentaria, their joint results of this and previous work being published in "The Native Tribes of Central Australia" and "Across Australia." In 1914 the Professor published a further contribution, in "The Northern Tribes of the Northern Territory."



SIR BALDWIN SPENCER

In 1912, at the request of the Commonwealth Government, he acted for one year as Special Commissioner and Chief Protector of Aborigines in the Northern Territory, and afterwards furnished a valuable report to the Government dealing with the existing conditions of the natives and embracing important suggestions for their future treatment. In view of his intimate knowledge of their daily life and customs, and his sympathetic interest in their welfare, a more suitable selection could not have been made, and the greatest confidence was reposed in his decisions.

On the death of Sir Frederick McCoy, who had held the position of Director of the National Museum from its foundation in 1856 until his death, in May, 1899, Sir Baldwin Spencer volunteered his services as Honorary Director, and his offer was accepted. His first act was to recommend the transfer of the Museum to its present site, a suggestion which Sir Frederick McCoy had vigorously and successfully opposed forty years earlier, and within a few months the whole of the specimens were transferred and were being re-arranged in the large hall previously occupied by the Industrial and Technological Museum.

Plans were prepared for extensive and necessary additions, the central portion of which was completed in 1908. The Zoological collections, which had previously been arranged on a geographical classification based on Wallace's "Geographical Distribution of Animals," were re-classified on a Zoological basis. A special feature of the new arrangement was a hall devoted exclusively to the Australasian collections, and a few years later a Children's Room was added. His efforts on behalf of the Museum were untiring, and his interest equally keen in all sections of the Museum's activities. The collections were greatly enriched by his generous donations, the extent of which will probably never be fully known. In addition to numerous gifts of books, he quietly transferred the whole of the Zoological collection, numbering many thousands of specimens, including all his types, to the Museum, and would not permit of even the usual acknowledgment being made.

During his expeditions into the Northern Territory, Sir Baldwin collected many hundreds of birds, all of which he skinned himself, besides numerous small mammals, reptiles, and invertebrates. His greatest gift, however, and one with which his name will always be intimately associated, was his extensive and invaluable Australian Ethnological Collection. This not only embraced the various types of wooden and stone implements, ceremonial and other objects, which he had

personally collected and which are represented in the Spencer Hall of the Museum, but included the whole of his photographic material and phonograph records. His negatives alone numbered nearly 1700 and his lantern slides over 900, all of which he had personally catalogued.

He was recognised as the foremost authority on all questions relating to the aborigines of Australia. Throughout his work is evidence of that patience and careful observation for which he was noted, his great aim being to make it as trustworthy and free from error as was possible. In recognition of his work on Anthropology, he was elected an Honorary Fellow of the Anthropological Institutes of Great Britain and Ireland, Italy, and Washington, and a Correspondent of the Imperial Academy of Sciences at St. Petersburg. For his researches in Natural Science he received from the Royal Society of New South Wales, in 1923, the William Branwhite Clark Medal.

Although so widely known as a scientist, his ability as an artist also was of a high standard. He was a keen lover of Art, a competent judge and a friend of the artist, while his influence as a patron of Australian art was considerable. In 1926 he was presented with the annual medal of the Society of Arts in Sydney.

In addition to the degrees of M.A. and D.Sc., Sir Baldwin held the degree of Doctor of Letters. He was President of the Professorial Board of the Melbourne University and a member of the University Council from 1904-11; President of the Australasian Association for the Advancement of Science in 1921; Vice-President of the Public Library, Museums and National Gallery of Victoria until his resignation, last year; a Fellow of the Royal Society of London; a Corresponding Member of the Zoological Society, London, and a member of the Court of Directors of the Royal Humane Society of Australia. A keen enthusiast in athletic sport, he was for several years President of the Victorian Football League and first President of the University Sports Club, the members of which presented him with an inscribed silver Loving Cup, as a token of their affection and esteem. In recognition of his services to science, he was created a Companion of St. Michael and St. George in 1904, and was knighted in 1916.

Sir Baldwin Spencer left Australia for London in April, 1927, in order personally to superintend the publication of his book on "The Arunta," issued in two volumes, on the completion of which it was his intention to return to Melbourne. The great success of his book, however, induced him

to carry out an earlier expressed intention to write another book on the same subject, but in a more popular form. This resulted in the appearance, towards the end of 1928, of his "Wanderings in Wild Australia," issued in two volumes, and profusely illustrated with his own drawings and photographs.

With the completion of his books, his restless nature, even at his advanced age, called for further activities in the field of research, and this was apparently provided by an opportunity, which he could not resist, to study the customs of the primitive inhabitants of the southernmost part of Patagonia. Here he was destined to die, as he always wished, in the midst of the work he loved.

His death is a great loss, and by it the scientific world is infinitely the poorer. His work remains an imperishable record, which will bear fruit and serve to stimulate those who strive to follow in his footsteps. His generous nature, his wide sympathies and his inspiring enthusiasm endeared him to all with whom he was brought into contact, and his memory will be held in esteem by a wide circle of friends.

J.A.K.

NEW SCALE INSECTS.

The following Victorian Scale Insects (Coccids) have recently been described (from specimens forwarded by Mr. C. French, junr., Government Biologist), by F. Faing, in *Bulletin of Entomological Research*, Vol. XX, Pt. 3, May, 1929, Imperial Bureau of Entomology, London:—*Patiaspis springae*, on Lillac—Kew, Vic. (C. L. Plummeridge); *P. callitris*, on *Callitris*—Lake Hattah, Mallee, Vic. (J. E. Dixon); *Aspidiotus loranthi*, on *Loranthus pendulus*,—Eltham, Vic.; *Lepidosaphes harti*, on *Banksia serrata*—Bairnsdale, Vic. (T. S. Hart); *L. subnivea*, on *Calycotria tetragona*—Dimboola, Vic. (C. French, junr.); *Pseudonidia stenophyllae*, on *Acacia stenophylla*—Hattah, Vic. (J. E. Dixon).

The paper, "General Observations on the Australian Flora," by Mr. J. W. Audas, F.L.S., F.R.M.S., read before the Australian Association for the Advancement of Science, Hobart meeting, 1928, has been published in booklet form. Special features of the flora are dealt with, and its extent and distribution; the most important families are described, also some of the noxious weeds. A broad, comparative view of the flora completes the brochure.

An unusual visitor to the vicinity of the Botanical Gardens, Melbourne, recently, was a Blue Kingfisher, *Alcyon azurea*. The bird, perched on a stone on the bank of the river, was observed to rise about half an inch on its legs, with a jerky motion, every few seconds. I also noted a Java Dove, so nearly black in colour, that the ring around the neck was almost invisible.

W.H.I.

AUSTRALIAN FOSSIL PLANTS.

[Notes on an address, illustrated by about 30 lantern slides, given by Mr. F. Chapman, A.L.S., F.G.S., in the form of a sequel to the very instructive paper on the oldest known land plants, here and elsewhere, delivered earlier in the evening by Miss I. C. Cookson, M.Sc., at the Club's meeting, August 12, 1929.]

Following after the evolution of the *Psilophyton* flora, true ferns and the swamp-living *Cordaites* came into existence. In the Upper Devonian, for instance, as at Iguana Creek, Victoria, and the Genoa River, in New South Wales, there is the fern *Archaeopteris Howitti*, another species of which was, at about the same period, flourishing in the Upper Devonian of Ireland. The *Sphenopteris ignanensis* also lived in the same Victorian locality at that time, whilst a related species has been found in Devonian rocks at the Genoa River. The *Cordaites* of the Iguana Creek beds is not common, and it is also found at Rystone and Eden, in New South Wales.

With the incoming of the Carboniferous stages, the palaeogeographic conditions in Australia were very different from those of Europe and North America, where the great coal forests were developed. For here, although the giant lycopod, *Lepidodendron*, has left much evidence of its former existence, the remains were never so abundant as to make conspicuous coal-beds, as was the case in the European coal-fields. Some of the specimens of a *Lepidodendron*, from the Star Series of the Drummond Range, show excellent woody structure, and as perfect as in some modern trees.

The Australian Horse-tails were, in the Carboniferous, represented by *Asterocalamites* and by the genus *Calamites* itself, though this latter plant, attaining to the height of trees in Great Britain, was here very much smaller.

The best-known of our palaeozoic fossil plants is undoubtedly the once-supposed fern, *Glossopteris*. Since then Dr. Walkom has clearly shown that the presence of the scale-leaves indicated the presence of seeds, and these have now been found, and described by Walkom as *Nummulospermum*. And not only this, the seeds have been sectioned and their internal structure studied.

The origin of the Bog-head Coals and the Kerosene Shales has long been a subject for discussion amongst palaeobotanists. The Scotch Boghead, Torbanite, the Kerosene Shale of New South Wales, and many others, have been generally ascribed to the agency of a plant thallus; in the case of the Australian oil shale, to a member of the *Volvo-*

cineae (by MM. Renault and Bertrand). Later on the opinion of certain botanists veered round to the spore origin, but microscopic structure does not support this idea. Reinhardt Thiessen, in 1925, compared the organism of Kerosene Shale with an alga he had identified in the Coorong, of South Australia, under the name of *Elaeophyton*. There is good evidence that this view is correct, and that the thallophyte of the Permocarboniferous is still forming "mineral rubber."

The so-called White Coal of the Mersey Valley, Tasmania, was in the first place regarded by E. T. Newton as largely composed of spores. It is more than likely, however, that even these may turn out to be a peculiar form of thallophyte allied to *Elaeophyton*. This, I believe, will form a research study by Miss I. C. Cookson when she returns to Melbourne. An interesting fact in connection with the Tasmanite shale is the occurrence of the thin-shelled fossil, *Aviculopecten*, embedded in the rock. These paper-like shells must have been blown into the sapopelic lagoons from the seashore, at the time of the accumulation of the rock.

The Triassic flora was well represented by such species as the Horse-tail, *Schizoneura*, from the Hawkesbury Sandstone; early forms of *Taeniopteris*, a doubtful fern; the broad-leaved *Macrotaeniopteris* and *Thinnfeldia*, a true fern, found very commonly in the rocks of the Blue Mountains, as well as in the coal beds of Leigh's Creek, in South Australia.

In Victoria, the Walloon Series of Queensland is seen in the black coal beds of Gippsland. There the predominant plant of the coal deposits is an Araucarian, *Araucarites Barklyi*, and others. The most ancient representatives of the dicotyledonous plants in Australia seem to be those from the Styx River Series, and which, as in other countries, show a resemblance, but not identity, with those of Tertiary and living forms.

Fossil leaves described by Ettingshausen from Queensland as from the Cretaceous are now known to be of Tertiary age. In Victoria, one of the oldest of these leaf-bearing deposits is found under the older basalt at Berwick. Notwithstanding the interest of this leaf-bed, the Club has not, to my knowledge, visited the locality. There we find many genera of living shrubs and trees, but of extinct species. The Eucalypts alone are of surpassing interest, for they show an admixture of archaic and modern types. Associated are representatives of a warmer climate, such as *Cinnamomum*.

Reference was also made to the ancient *Eucalyptus* of the Deep Leads, of the Dargo High Plains, allied to our modern *E. ficifolia*. This and the other associated leaves must have

been washed into alluvial fans when these high levels were close to the coast-line.

That our present flora is very ancient was shown by the discovery of skeleton leaves in the brown coal of the Moorlands in South Australia, by Sir Douglas Mawson, of the New South Wales Waratah (cf. *Telopea speciosissima*) and of *Bankzia marginata*. These were so perfect that, after receiving them through the post, I mounted them as transparencies on slides. These leaves must have fallen on the old land-surface at least three million years ago, since when that area sank beneath the sea and a great deposit of polyzoal limestone was deposited above it. Other Tertiary plants of especial interest were described amongst which were the *Ginkgo*, from Morwell, out of the brown coal.

FOSSIL GALLERIES OF THE NATIONAL MUSEUM.

The excursion, on Saturday, July 27, was well attended, the Club members being joined by a large and enthusiastic body of young naturalists from the Mornington Field Club under the guidance of the Rev. George Cox.

After examining the more recent acquisitions to the collection, such as the Trilobites from Kinglake, and the remarkably large Silurian starfish from the now renowned brickpit at Brunswick, we turned to some of the exhibits in the adjoining wall-case. Here are seen fine specimens of the Old Red Sandstone fishes, first brought to light by the baker-geologist, Robert Dick, and the stonemason, Hugh Miller. Differences from modern fishes were pointed out. Then the curious way in which fishes are supplied with teeth came in for a share of enquiry, for some are furnished with teeth on an endless band, while others have the old teeth tucked away on a spiral denture, and, again, there are the ganoids of the *Lepidotus* type, with their piles of teeth arranged in an ever-ascending series of buttons. Some recent discoveries at Taggerly, by Mr. E. S. Hills, of the University of Melbourne, were referred to, and their relationship to some others found in Canada, was pointed out in the wall-case.

The giants of the collection told their story by their curious formation of jaw, limb and backbone. The kinship of the *Megatherium* with the almost impossible *Glyptodon*, was shown by the form of the forepart of the skull and, although in the one case the animal was clothed with a tough skin, in the other it had a bony cuirass.

Of the Australian fossils, perhaps the most attractive was the fine replica skeleton of the *Diprotodon*. This giant animal, not so long ago, roamed throughout the length and breadth of the land, wherever there was luscious herbage and moist conditions. Other objects, exhibited in the wall cases, were ancient pearly nautilus, corals of the old Silurian reefs, sea-urchins of the old shore-line bordering the Murray Gulf, and the magnificent slabs of graptolites.

In recording these notes of a visit to the fossil galleries I would like to say how pleasing it has been to me during my official connection with the National Museum to have had the privilege of conducting, so many times, parties of brother Field Naturalists over the fine collections that have been in my charge since March 1902.

F.C.

FLORA BETWEEN BROKEN HILL AND
MOOTWINGEE.

By EDWARD E. PESCOFF, F.L.S.

The flora of the so-called Desert country around Broken Hill and between that place and the famous Mootwingee Range, nearly 100 miles to the north-east, is of great interest to one coming from the south. The rainfall is very slight, Broken Hill enjoying an average of only about 10 inches a year, while further north the rainfall is considerably less. At one place of call between Broken Hill and Mootwingee, we learned that no rain had fallen for more than two years! And yet such a country and climate has its flora.

Here we see the so-called "Spinifex," *Triodia irritans*, so well named by Robert Brown. The foot or two long, stiff, rigid leaves, each sharply pointed, are irritating enough to anybody. No wonder that the Kookaburra aeroplane could not take off in spinifex country, especially as *Triodia* grows in very light, thin sand. This plant is the source of the spinifex gum, so frequently used by the aborigines for fastening their stone weapons on to the woody portions.

Other than this species, at the time of our visit (March, 1929), very little grass was seen anywhere. In most places an odd plant of the ever-present *Danthonia* showed mossily through its tufts. At Mootwingee itself, near one of the rock-pools, some wonderfully fine plants of one of the kangaroo grasses, *Themeda membranacea*, were luxuriating.

A notable tree in these districts is the Leopard-wood; *Flinckersia maculosa*, which is both beautiful and remarkable. It commences life as a small cluster of thorns. These thorns and thorn branches increase in size and area, until a small thorny bush, without definite structure, is growing in entangled form. Then presently a central stem shoots up, growing taller and taller, carrying with it the thorn masses, ultimately becoming a shapely tree, often without any sign of a thorn at all. These thorn masses usually hang in the crotch of the tree until decay causes their disappearance. The trunk of the tree is beautifully blotched and spotted white and brown, with spots from the size of a shilling piece and much larger. Hence is derived the well-deserved name of Leopard-wood.

Another notable plant met with is *Coultasium oleifolium*, belonging to Rubraceae, which produces fruits less than an inch in diameter. These well-flavoured acidulous fruits are commonly used for making summer drinks, and quite palatable drinks they are. Sir Thomas Mitchell refers to this plant in his "Journeys in Tropical Australia"; it was discovered by him in 1846.

Another fruiting tree frequently met with, both at the ranges and in the open country, is the Desert Lime, *Brembocitrus Australasica*. The fruits of this wild orange or lime

are very small, but some day a great plantsman may develop them into commercial size. And while we are waiting, America possesses many hundreds of thousands of young seedlings of this tree in nurseries, attempting its development, and testing it also for stock purposes.

Two bulbous plants of the Amaryllid family are occasionally seen in soft soils; they are the Darling Lily, *Crinum flaccidum*, and the Garland Lily, *Calostemma purpureum*, which were in flower at the time of our visit; the former with large, white, fragrant flower clusters, and the latter like a small rose-pink cluster Narcissus. The bulbs are very deeply rooted in the soil—to avoid dying out in drought times—and several attempts to dig them up failed.

Among the Mootwingee rocks were found plants of the almost universal Rock-fern, *Cheilanthes tenuifolia*, possibly the nearest adjacent living witnesses to the remarkable work of rock carving of the aborigines.

One of the really beautiful plants of the district is *Solanum Sturtii*, low plants not a couple of feet in height, which were simply massed with beautiful violet coloured flowers, blooming in great profusion in dry places. This should make a welcome addition to our garden shrubs, if we could induce it to grow under cultivation.

At Mootwingee, two uncommon shrubs—or uncommon to southerners—were seen. They were *Petalostylis labicheoides* and *Abutilon otocarpum*. The *Petalostylis* was a handsome shrub with bright-green foliage, giving an abundance of rich yellow, Cassia-like flowers. It is the next genus to *Cassia* in Leguminosae.

There were no Orchids, but Dr. William Macgillivray told us that the Mitchell-Greenhood, *Pterostylis Mitchellii*, had recently been collected in the district in the spring time. There were many typically Australian plants, including the Neallie, *Acacia Loderi*, a beautiful tree; the Mulga, Bullock bush, Needle bush, Belar, Black Oak, and others; while at Mootwingee the ever-present Red Gums, *Eucalyptus rostrata*, showed their white trunks, glistening in the moonlight and shining in the sun.

Two plants of the introduced flora were common around Broken Hill. The pale form of the Mexican poppy, *Argemone mexicana lutea*, was displaying its beautiful open lemon coloured flowers, much paler than those of the species; while common was the Tobacco bush, *Nicotiana glauca*.

One mournful note must be struck, and that is, as a result of droughts and over-stocking, many plants are disappearing. Notably this is true of the Desert Rose, *Cientafugia Sturtii* (*Gossypium Sturtii*); one of our most beautiful flowering shrubs, which is growing in Dr. Macgillivray's garden. It is reported as being extinct in its wild state in these districts, and in areas further north.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, September 9, 1929. The President, Mr. P. R. H. St. John, occupied the chair, and there were about 120 members and visitors present.

The President alluded to the death of Mr. H. L. Torpy, a member since 1926, and that of Mrs. H. Hughes, and called on the members present to stand for one minute in respect for their memories.

CORRESPONDENCE.

From Sir Alexander Peacock, K.C.M.G., regretting his inability to be present to open the Wildflower Show, and wishing it every success.

From Mr. A. K. T. Sambell, of the Westernport and Phillip Island Shipping Service, drawing attention to the attractions of Phillip Island as a holiday resort.

REPORTS.

Reports of excursions were given as follows:—Heathmont, East Ringwood, heath, etc., Mr. F. G. A. Barnard; South Morang, botany, etc., Mr. A. J. Tadgell.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As ordinary members: Mr. C. H. Metcalfe, State Treasury, Melbourne; and Miss A. Jones, Canterbury; as associate member: Master M. Blackburn, junr., Essendon.

GENERAL.

A motion was passed congratulating Mr. Chas. Franch, *senr.*, a foundation and life member of the Club, on his attaining his 90th birthday, on September 10.

LECTURE.

Mr. J. A. Kershaw, F.E.S., delivered a very interesting lecture on "Australian Marsupial Forms," dealing with all the families, including the Monotremes and the extinct *Diprotodon*. His remarks were illustrated by marsupial skulls and bones, numerous skins, and photographic lantern slides.

EXHIBITS.

By Miss N. Hart.—Specimens of Tall Greenhood, *Pterostylis longifolia*.

By Mr. J. Searle.—(a) Larval stages of the Brine Shrimp, *Parartemia zeitziana*, Sayce. (b) Bead armlets, necklets, belts and other adornments from Durban, South Africa. (c) Comb from Hebrides. (d) Lime-stick from Papua.

By Mr. C. Borch.—Specimens of Imperial White Butter-

fly, *Delias harpalace*, showing upper and lower surfaces and old pupal shells.

The following were shown as examples of successful cultivation:—

By Mr. G. Coghill.—*Grevillea rosmarinifolia*, *Acacia myrtifolia*, *Eriostemon myoporoides*, *Micromyrtus ciliatus*, the two last being sold by nurserymen as *E. nerifolius* and *Baccharis plicata* respectively (error).

By Mr. C. Daley.—*Lhotskya alpestris*, *Thryptomene calycina*, *Micromyrtus ciliatus*, *Pomaderris apetala*, *Eugenia* (fruit), *Olearia argophylla*, *Calytrix Sullivanii*, *Chorizema cordifolia* and *Brachysema*, sp.

By Mr. P. R. H. St. John.—*Lhotskya alpestris*, Snow Myrtle, from the Botanical Gardens.

SOME ROCK-FERNS OF VICTORIA.

Although half of the 17 species of ferns growing on Mt. Bogong are found among the rock crevices, we usually associate our rock-ferns with the family *Cheilanthes*.

Notholaena (*Cheilanthes*) *distans*, *C. tenuifolia* and *C. Sieberi*, may all be confused, as, superficially, they are much alike. Near Melbourne, on the Kellor Plains, may be found in the rocks *C. tenuifolia* and *C. distans*, while we found, at our recent excursion to South Morang, in their rock surroundings *C. tenuifolia* and *C. Sieberi*. The last-named Mr. P. R. H. St. John drew attention to on an excursion to Greensborough and Eltham 12 months ago. These three ferns are also common to New Zealand.

At the You Yangs and other places the "Rock-Fern" (*C. tenuifolia*) may be found growing very tall, and it is often robust, with a wide frond half as broad as tall. Close to its roots the rhizomes are covered with silky scales, and the stipes, or stalks, of the fronds are tufted (like the roots), and are erect, flexible, purplish-black, polished and slightly hairy below. The pinnae are nearly opposite, but mostly alternate, in pairs; the ripe seed cases or sori project in black masses beyond the margins. This species may be said to be more ample and compact than the following two species.

C. Sieberi (Creeping Rock-Fern), like the last species, is only scantily hairy, was regarded formerly as a variety of *C. tenuifolia*, and was once known as *C. Prossiana*. It is much looser or skimpler, and has strong, wiry, densely-tufted stipes, which are in crowded rows. It is about one-sixth as broad as long. It likes volcanic ground, and is usually found on rocks where there is but scanty soil covering. Its fronds are narrow and erect, wiry, polished, dark black, only slightly hairy at base, and much of it is naked. Pinnae are opposite, more pinnate than *C. tenuifolia*. The sori masses never project beyond the margins.

N. distans (Bristly Cloak-fern) is very like *C. Sieberi*. Both are dwarf, and love to grow exposed on rocks to the blazing sun. The unrolled fronds of *N. distans* are densely covered with white hairs that look like tufts of cotton wool. Leaflets are broader and blunter, and the fern frond has a thick and woolly appearance, whereas *C. Sieberi* is comparatively free from hairs; the fronds are of grey-green colour, almost naked for half its length. Seed masses have a very inrolled covering, and the frond is much narrower in proportion to its length.

—A.J.T.

RESULTS OF A COLLECTING TRIP TO THE CANN
RIVER, EAST GIPPSLAND.

By J. CLARK, F.L.S.

[This trip (November 26 to December 8, 1928) was one of a series, undertaken by different members of the Club, and financed from the special fund, a sum of £200 made available through the kindness of Senator R. D. Elliott.]

The journey from Melbourne to the Cann River appeared to offer splendid collecting conditions as far as Warragul; the country containing an abundance of flowering plants, particularly *Leptospermum*. From Traralgon onwards the country began to assume a very dry appearance, and from Sale it was evident that much work would have to be done to get material. Unfortunately, these dry conditions existed throughout the whole area; nevertheless, much valuable material was obtained.

No flowering plants were observed along the Prince's Highway, the flower season having finished some weeks previously. One small area of *Leptospermum*, whose flowers were long past their prime, was located near the Cann River. It was here that most of the main collection of insects was made, during the first two days. The surrounding country appeared to be very promising as a collecting ground, but on investigation it was found to be rather poor. No doubt, during a good season, this district would prove to be a naturalist's paradise; judging from the material collected during the long dry spell.

The Cann River, like most others in this part of the country, is a small stream in summer, but a raging torrent in winter and spring. The banks are deep and steep, with little or no debris lying about, having been washed away by the winter floods. The small township is situated in a large alluvial basin; no rocks or stones are to be found for miles around in either direction. The entomologist is, therefore, disappointed in losing the fine harbour for ground insects afforded by logs and stones. The banks of the river were the most profitable collecting grounds, but here progress was slow, owing to the dense jungle, which, in many places, one could only penetrate on hands and knees. In this river jungle the Rock Orchid, *Dendrobium speciosum*, was abundant, making a fine show on the limbs and trunks of the trees. In many places, the work of the cockatoos was greatly in evidence; numerous trees showing only too clearly where the birds had been cutting out the larvae of wood-boring beetles. From the appearance of the tunnels and pupal chambers observed, the larvae were those of the longicorn beetle, *Tryphocharia*. Near the bridge, in a large belt of

eucalypts, the only bell-birds in the district are to be seen and heard day long. An interesting half-hour was spent in watching them hunt a kookaburra from the vicinity.

In the jungle, insects were not numerous, but other forms of life were met with. Of these, probably the most abundant everywhere was the small land Crustacean, *Talitrus sylvaticus*, Hasw. Specimens were found under all debris in shady places. Land shells were represented by some interesting

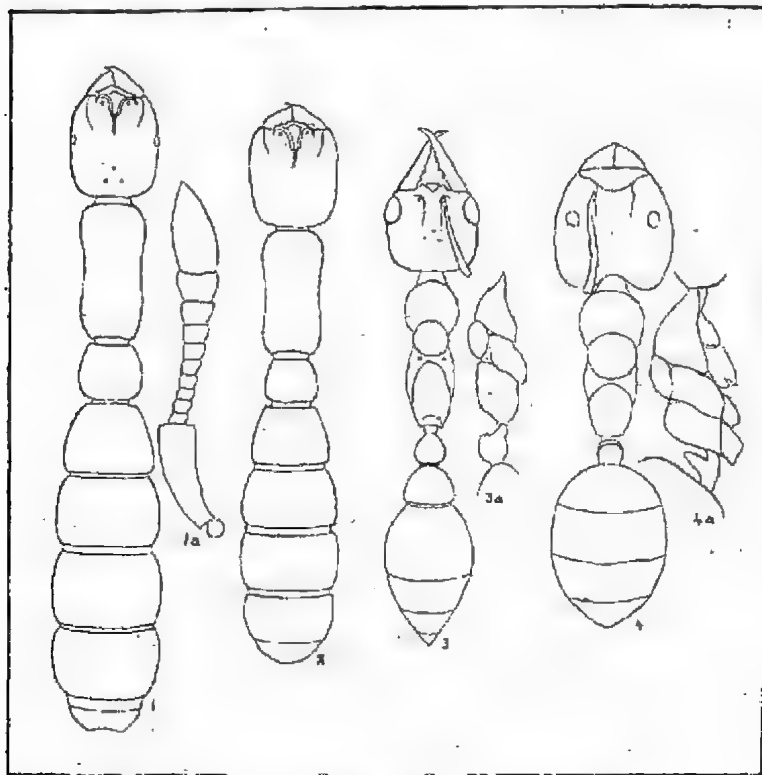


Fig. 1. *Eusphinctus hirsutus*, n.sp. dorsal view of female
 1a. " " " " antenna
 2. " " " " dorsal view of worker
 3. *Myrmecia pulchra*, n.sp. " " " " thorax and node in profile
 3a. " " " " antenna
 4. *Iridomyrmex foveans*, n.sp. dorsal view of worker
 4a. " " " " profile " "

forms, which have been dealt with by Mr. C. J. Gabriel. These shells were confined to a few small areas near the bridge, and were all taken under debris on the ground. As the main object was to collect insects, too much time was not devoted to shells, and undoubtedly other species were overlooked. In the more open country, near the river, several

Frogs and lizards were obtained. Spiders of various species were captured in all localities, but not in abundance.

Butterflies were not numerous, either in species or individuals; the most important of the group being *Candalides xanthospilus*, Hubn. This is one of the "Blues," and is a rare insect in Victoria, but has been previously taken near Lakes Entrance on two occasions. The only other "Blue" met with, *Neolucia agricola*, was in great abundance. "Skippers" were scarce, only one species being found. One specimen of *Tisiphone* was seen, but not captured. *Heteronympha* was fairly common. Moths were more abundant, but not numerous. Five species of Geometridae and two of Zygaenidae were the most important. No new species in either group were taken.

Coleoptera were the most numerous, both in numbers and species. Over 100 species, representing 17 families, were found. Of these, the most interesting undoubtedly is the small beetle belonging to the Family Scurabaeidae, *Macchidus tibialis*, Lea. Numerous specimens, also larvae and pupae, were obtained in a termitarium of *Calotermes sedulus*, Hill. All stages were found in the middle of the large mound when it was dug into for specimens of the termites. In addition to the beetles, many larvae of an, at present, unknown fly were found in the same place.

Termites were numerous in individuals, but only three species are represented in the collection, one of these being a new species, according to Mr. G. F. Hill, to whom the material was submitted for identification. Diptera is represented by 30 species, in six families, the most interesting being the crane-flies. Four species were found, of which two are new, and one apparently very rare. These have been examined, and dealt with, by Dr. C. P. Alexander. Asilidae, or robber-flies, were common, in a few species. Fifteen species of Muscidae have, so far, been undetermined.

Six species of dragon-flies were found, all known forms. The "scorpion fly," *Harpobittacus australis*, was abundant. One species of May-fly was abundant, hovering over the water during the early evening. Dr. R. J. Tillyard, to whom this was submitted, considers that it is a new species, and it will be dealt with later. The residents in the district informed me that no trout, or other fishes, except eels, are found in the river. This cannot be due to a scarcity of food, as much aquatic insect life was noted there. Hemiptera, or bugs, are represented by 10 species, in five genera. Cockroaches were numerous in individuals, but only three species are represented in the collection. Hymenoptera were not abun-

dant, but 17 species of wasps, eight species of bees, and 22 species of ants were found. A few of the wasps belong to the parasitic groups of Braconidae, and Ichneumonidae, the others being flower wasps. Mr. T. Rayment has dealt with the bees, all of which are included in his article on the subject. The ants include three new species; these are dealt with separately.

SUBFAMILY CERAPHACVINÆ.

Eusphinctus Hirsutus, n.sp.

(Pl. 1, Fig. 1-2.)

Worker. Length, 3.5-5mm.

Head, thorax and node brown, or reddish brown, gaster lighter, more yellowish, legs and apical segments of the antennae pale testaceous.

Head densely punctate. Thorax punctate, these are much smaller and more widely scattered than on the head, more abundant on the sides than on the disc where it is shining between the punctures. Node and gaster also densely punctate, but much finer than on the head. The mandibles are coarsely punctate.

Hairs yellow, sub-erect, very abundant, long and pointed; shorter and more oblique on the antennae and legs.

Head one-sixth longer than broad, the occipital angles rounded, sides feebly convex, almost parallel. Mandibles triangular, abruptly bent near their base; the inner border armed with six small teeth. Clypeus very short, the anterior border with a slight rounded projection in the middle; this projection is yellowish and semi-transparent. Frontal carinae short, erect, truncate and confluent behind, encircling the antennal insertions in front; this portion is indented on the top edge in front. Carinae of the cheeks hardly apparent. No eyes. Antennae short and robust. Scapes extend just beyond the middle of the sides of the head; all the segments of the funiculus broader than long, except the apical, which is as long as the five preceding segments together. Thorax twice as long as broad through the pronotum, without traces of sutures on the dorsum. The anterior border of the pronotum and feebly margined, the sides convex at the pronotum and epinotum, slightly constricted at the mesonotal region, not marginate. The posterior border of the epinotum concave, the declivity abrupt, margined on the sides and above. Node slightly broader than long, the anterior border straight, the lateral and posterior borders convex; in profile it is as high as long, the anterior face vertical, the dorsum and posterior faces united in a curve; there is a long, broad, sharp pointed

tooth on the ventral surface in front, directed forward. Postpetiole one-fifth broader than long, broader behind than in front, the anterior border straight, the sides feebly convex. There is a deep and wide constriction between each of the segments of the gaster. Pygidium feebly emarginate, or depressed, on the dorsum. Legs short and robust.

Female.—Length, 4-6mm. Ergateoid.

Similar to the worker, but larger and the colour much darker. Eyes and ocelli well developed. The pygidium is concave, submarginate on the sides.

A small colony was found under a log on the bank of the Gunn River. The nest contained about 60 workers and 5 females. This species is not close to any at present known. It differs from *E. steinheli*, Forel, in being larger and more robust, and more densely clothed with long hair. The form of the clypeus readily separates it from all the other known species.

SUBFAMILY PONERINAE.

MYRMECA PULCHRA, n.sp.

(Pl. 1, Fig. 3.)

Worker.—Length, 18-20mm.

Head and gaster black, thorax and both nodes bright red, mandibles, clypeus, antennae, anterior legs and all the tarsi testaceous, the coxae, femora and tibia of the middle and posterior legs brown, the joints lighter. On a few examples, the top and sides of the epinotum are tinged, or shaded, with brown.

Mandibles smooth and shining, with a few scattered, shallow, elongate punctures, and a row of large piligerous punctures on the inner edge at the base of the teeth. Clypeus shining, finely and irregularly rugose, there are some longitudinal striae in the depressions at each side of the median projection. Head longitudinally striate, with a dense microscopic reticulation between the striae. Thorax coarsely striate-rugose, the striae on the pronotum are longitudinally arched, transverse on the mesonotum and epinotum. Node rugose, with a circular direction. Postpetiole and gaster smooth and shining, microscopically punctate.

Hair long and yellow, erect, abundant on all the body, shorter and oblique on the legs, none on the antennae, except a few at the apex of the scape. A very fine short, close-lying pubescence abundant everywhere, but longer and even more abundant on the gaster, where it forms a distinct covering. On the top of the gaster the pubescence has, on most examples, a golden sheen.

Head just a shade broader than long, the occipital border and sides straight, the angles rounded. Mandibles fully one-quarter of their length shorter than the head, their external border straight, or very feebly concave; the inner border convex, armed with eleven teeth, the first two are small, third, fifth, seventh and ninth are large, fully twice as long and broad as the others. The ninth forms a slight angle, from where the mandible is reduced at the base. Clypeus widely but not very deeply emarginate in front. Frontal ridges parallel, not extending to the anterior ocellus. Eyes large and convex. Antennae short, the scapes extend beyond the occipital border by twice their thickness; first and second segments of the funiculus of equal length, the other subequal to the apical, which is as long as the first. Thorax two and one-third times longer than broad through the pronotum. The pronotum strongly convex, flattened above. Mesonotum circular, convex above; in profile it is raised above the level of the pronotum and epinotum. There is a deep and wide constriction between the mesonotum and the epinotum, the latter is one-third longer than broad; in profile it is flattened above, the declivity face abrupt, steep, rounded into the dorsum by a strong curve. Node as long as broad, slightly broader behind than in front; in profile it is almost as high as long, the stalk short, only one-fifth of the length of the node, the anterior face straight, forming a right angle with the dorsum, the latter flattened and rounded behind into the posterior face. Postpetiole broader than long. First segment of the gaster broader than long, and much broader behind than in front. Legs short and stout.

Female.—Length, 20-22mm.

Similar to the worker, but larger and winged. The colour is darker, more brownish on the head, thorax and legs; the apical third of the mandibles brown.

Described from a small colony, found under a log, near the bridge at Cann River. This species is not close to any previously described forms. In most species of the genus, *Myrmecia* s. str., the mandibles are as long as, or longer than, the head, but in the present species they are much shorter. These, together with the rather short scapes and node, tend to connect this with *M. esuriens*, Fab., from Tasmania. They are, however, very distinct. Several isolated specimens were taken on tree trunks throughout the bush in the district.

MYRMECIA FORFICATA, Fabr.

A widely distributed and common species was found abundant in the district. In most cases, the nests were of the large mound type.

MYRMECIA TARSATA, Smith.

Cat. Hymn. Brit. Museum, 6, p. 145, 1858.

A common species in New South Wales, where it is generally known as the "black bull ant." This species occurs in many places in eastern Victoria, but has not previously been recorded. It is deep shining black, with the mandibles and apex of the gaster yellow. No nests of the species were seen, but many examples were found running on the ground and on tree trunks.

MYRMECIA TARSATA, Smith.

Cat. Hymn. Brit. Museum, 6, p. 144, 1858.

A common and widely distributed species in South-east Australia.

MYRMECIA (PROMYRMECIA) URENS, Lownd.

"The Entomologist," London, 2, p. 336, 1865.

A common and widely distributed species. It extends from Queensland round the coast to Western Australia. This species is frequently found swarming over plants and trees in flower.

MYRMECIA (PROMYRMECIA) PILOSULA, Smith.

Cat. Hymn. Brit. Museum, 6, p. 146, 1858.

The most common and widely distributed species of the genus. Originally described from Tasmania, it is abundant in all the States.

AMBYOPONE AUSTRALIS, Erichson.

Arch. f. Naturg., 8, p. 260, 1841.

A common and widely distributed species, being found throughout Australia and Tasmania.

CHALCOPONERA ASPERA, Roger.

Berl. Ent. Zeitschr., 4, p. 308, 1860.

A handsome and not common ant confined to the south-east corner of Australia. It is brilliant metallic green, with reddish antennae and legs. The workers are about half an inch long.

SUBFAMILY MYRMICINAE.

PHEIDOLE BOMBALENSIS, Forel.

Rev. Suisse Zool., 18, p. 43, 1910.

Originally described from New South Wales, this species was found along the river bank.

APHAENOGASTER (NYSTALOMYRMA) LONGICEPS, Smith.

Cat. Hymn. Brit. Mus., 6, p. 128, 1858.

Wheeler, Trans. Roy. Soc. S. Aust., 40, p. 214, 1916.

A common and widely distributed ant. The ants of this genus live in small colonies underground. They construct a small crater-like funnel at the entrance to the nest. They

come out at night to forage. During the day a few specimens can always be observed just within the entrance at the bottom of the crater, apparently "on guard"; they drop down the tunnel at the least alarm.

SUBFAMILY DOLICHODERINAE.

LEPTOMYRMEX ERYTHROCEPHALUS, Fabr.

Syst. Ent., p. 391, 1775.

Common in Eastern Victoria and New South Wales. It is generally known as the "silly ant," from the curious habit of rearing up and spinning around when disturbed. Several species of this genus are known to store honey in their bodies, but not to the same extent as do the "honey pot ants" of the interior. No females have so far been recognised in this genus. Males and workers are commonly met with.

DOLICHODERUS (HYPOCLINEA) SCABRIDUS, Röger.

Beil. Ent. Zeitschr., 4, p. 308, 1860.

A common and widely distributed species, in south-eastern Australia. The colour of the antennae varies from brown to reddish in the members of a nest.

IRIDOMYRMEX DETECTUS, Smith.

Cal. Hymn. Brit. Mus., 6, p. 36, 1858.

The most common and widely distributed ant in Australia. It is generally known as the "mound ant" from its habit of making huge mounds over its nest. It is the largest species in the genus, being about half an inch in length.

IRIDOMYRMEX GRACILIS, Lowie.

The Entomologist, London, 2, p. 280, 1865.

Common and widely distributed, it is a rather slender species, and runs very rapidly.

IRIDOMYRMEX FORTANS, n. sp.

(Pl. I, Fig. 4-4a.)

Worker.—4.5mm.

Black. Mandibles, antennae and tarsi brownish; in a few examples almost black.

Hair greyish, short and erect, very sparse and scattered. Pubescence greyish, very abundant everywhere, forming a light covering, but not quite hiding the sculpture; a little more dense on the gaster than on the head, and also more of a brownish tinge.

Head, excluding the mandibles, as broad as long, broader behind than in front, the occipital border very deeply indented, the angles strongly rounded and lobe-like, the sides evenly convex. Mandibles large, triangular, the inner border armed with nine strong sharp teeth. Clypeus short, truncate in front, its anterior border straight. Frontal carinae short, extending back to about the middle of the eyes. Eyes large

and flattened, their posterior border level with the middle of the head. The scapes of the antennae extend beyond the occipital border by barely their thickness. Thorax twice as long as broad through the pronotum, the latter strongly convex on top and on the sides, one-third broader than long. Mesonotum circular, strongly convex above. Epinotum separated from the mesonotum by a strong constriction, the basal face convex, almost globular, the dorsum and declivity united by a strong curve, both faces are of equal length; in profile the pronotum and mesonotum are much higher than the epinotum. Node scale-like, strongly inclined forward, the anterior face convex, the posterior face flat, the top edge rounded. Gaster oval, much longer than broad; legs long and slender.

Described from a colony nesting in an old stump at Camo River. This species comes nearest to *I. gilberti*, Forel. It is, however, larger and much more robust. In *I. gilberti*, the mandibles and tarsi are red, and the pilosity very abundant, even on the legs and antennae; the sculpture of *gilberti* is also much coarser and the head is not so deeply indented behind, also the epinotum is as high as the mesonotum.

This ant emits a powerful and pungent odour when disturbed. When annoyed, it rushes about with the abdomen erect, as is the habit of many species of the genus *Crematogaster*, diffusing the fumes. The odour can be detected for a considerable distance. This smell is much worse than the usual "rancid butter" smell given off by most species in this genus.

TECHOMYRMEX JOCOSUS, Forel.

Rev. Suisse, Zool., 18, p. 56, 1910.

A small colony found under bark. This is not a common species, and appears to be confined to Victoria.

SUBFAMILY FORMICINAE.

CAMPONOTUS (MYRMOSAULUS) SUFFUSUS, Smith.

Cat. Hymn. Brit. Mus., 6, p. 38, 1858.

Common and widely distributed throughout the State.

CAMPONOTUS (MYRMOPHYMA) INNEXUS, Forel.

Rev. Suisse Zool., 18, p. 56, 1910.

Originally described from New South Wales, this species is found abundantly in this State.

CAMPONOTUS (MYRMOPHYMA) NIGROAENEUS, Smith.

Cat. Hymn. Brit. Mus., 6, p. 60, 1858.

Found abundantly throughout south-eastern Australia.

POLYRHACHIS (CAMPOMYRMA) FENORATA, Smith.

Cat. Hymn. Brit. Mus., 6, p. 73, 1858.

Common and widely distributed throughout Australia.

BEES FROM EAST GIPPSLAND.

By TARBTON RAYMENT.

Mr J. Clark, of the National Museum, Melbourne, has been kind enough to allow me the privilege of studying the bees that he collected when visiting East Gippsland. All of the honey-gatherers were working on the flowers of a *Lapto-spermum*. I was not at all surprised to find that the species varied from the type-forms, because the flora of the extreme eastern end of the State is peculiar, and the climatic conditions are, in some ways, unique. The Red-bees, of the genus *Binghamiella*, are so dark that I feel justified in referring them to a new variety. The *Halictus*, the *Parasphacodes* and the *Gnathoprosopis* are new.

DIVISION COLLETIFORMES.

Family Prosopididae

BINGHAMIELLA ANTIPODES (Smith), variety *nigra*, n. var.

This form is slightly smaller than Smith's type, and though the remarkable sculpturing of the mesothorax presents no structural differences, the red of the abdomen is indefinite. The first segment is jet-black and highly polished, and the other segments are so strongly suffused with black that the red is very obscure. Moreover, the wings, too, are much more strongly coloured with the purplish-black iridescence. Specimens of this genus from Croydon, Ringwood, Ferntree Gully and Kiata have a clear-red abdomen, with only portion of the first segment showing any black, but these Cann River females are dark enough to be called *nigra*. A specimen from West Australia (Forst) has no black on the abdomen. Type in National Museum, Melbourne.

GNATHOPROSOPIS NIGRITARSUS, n. sp.

Female.—Length, 6mm. approx. Head black, ordinary. Face-marks lemon-yellow, pointed below; wavy truncate at insertion of antennae; frons closely and finely punctured, dull; clypeus punctured, but not so closely as frons; supra-clypeal area similar to front; vertex with wine-pink ocelli; compound eyes claret-brown, slightly converging below; genae with fine striation; labrum black; mandibulae truncate, bidentate, blackish-brown; antennae submoniliform, scape black, slightly dilated, flagellum black above, ferruginous beneath. Prothorax swollen laterally, lemon-yellow, except fine black interruption at middle. Tubercles bright lemon-yellow. Mesothorax dull, black; finely and closely punctured; minute lines joining the punctures. Scutellum similar to mesothorax. Postscutellum similar to mesothorax. Metathorax black, bright, with rugae, partly radiating, of medium size. Ab-

domen: dorsal segments black, bright, closely punctured, but not so close as on mesothorax; ventral segments black, with a few short stiff white hairs. Legs black, with a few short stiff white hairs. Tarsi black, anterior and middle with fulvous hairs; claws blackish-red; hind calcaria pale, finely serrated. Tegulae black, bright, with the sculpture of the mesothorax. Wings hyaline iridescent; nervures blackish-brown, basal arched, just short of nervulus, second intercubitus bent; cells: radial large, second cubital receiving second recurrent at apical third; pterostigma large, blackish-brown; hamuli five, of weak development.

Locality, Cann River, Gippsland, Victoria. Date, November, 1928.

Biological data: On flowers of a *Leptospermum*. I have a specimen from flowers of *Eucalyptus calophylla*, at Sandringham. This bee has a minute creamy spot at the base of the tibia, and lacks the fulvous hair of the tarsi. It may be regarded as variety *maculata*.

There is a large group of Australian bees, about 6mm. in length, with a bright yellow collar on prothorax, yellow face-marks and tubercles, and with yellow on the legs.

Gnathoprosopis hackeri, Osh., has scapes with a reddish stripe; yellow on legs, and light markings on posterior tibiae. *Gnathoprosopis nigratarsus*, Raym., legs entirely black, the tegulae black. *Gnathoprosopis nigratarsus* var. *maculata*, Raym., yellow on legs confined to a creamy spot at base of tibia.

DIVISION ANDRENIFORMES.

Family Andrenidae. Subfamily Halictinae.

HALICTUS ELLIOTTI, n. sp.

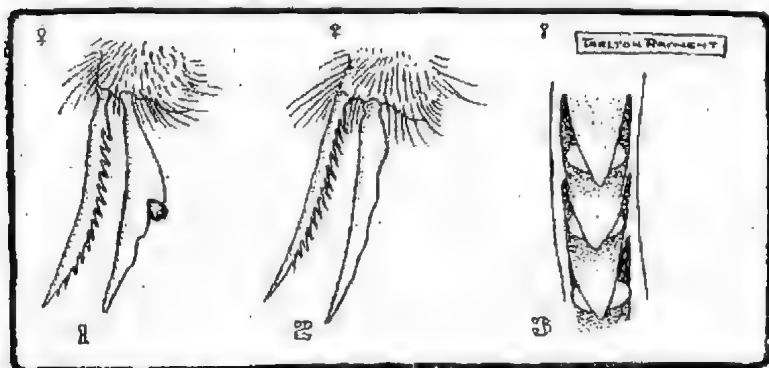
Female.—Length, 8.5mm, approx. Face-marks nil; frons coarsely punctured, a few scattered white hairs. Clypeus prominent, coarsely punctured. Supraclypeal area coarsely punctured, bright, a few white hairs. Vertex with clear glassy ocelli. Compound eyes claret-brown. Genae punctured, a few white hairs; labrum black; mandibulae black, with obscure rufous patch; antennae black, submoniliform. Prothorax not visible from above; tubercles black, a fringe of pale hair. Mesothorax black, coarsely and densely punctured, a few white hairs surround the thorax; scutellum bi-gibbous; post-scutellum, with a light covering of fulvous hair. Metathorax with a large, crescent-shaped area, with coarse anastomosing rugae diminishing at sides of truncation. Abdomen: dorsal segments shining, hind margins very narrowly reddish, third with a shining narrow band of cinerous pubescence, a patch

of similar hair at sides of second; ventral segments have a fringe of white hair. Legs black, with white hair, except the fulvous hair of the tibiae; tarsi with light fulvous hair; claws pale reddish. Hind calcariae pale yellowish, with no defined teeth, but has a wide wavy edge. Tegulae dark amber. Wings hyaline; nervures dark amber; cells normal for *Halictus*; pterostigma dark amber. Hamuli of moderate development.

Locality, Cann River, Gippsland. Date, November, 1928.

Biological data. Captured on flowers of a *Leptospermum*. At the request of Mr. J. Clark, I have dedicated the species to Senator R. D. Elliott.

This species is close to *H. lanarius*, Smith, and *H. lanuginosus*. Comparing it with a specimen of the former species determined by Prof. Cockerell, *H. elliotii* is blacker, since it is less hairy; there is not any fulvous or light hair about the



1. Calcariae of *Halictus lanarius* SMITH, with pebble wedged by tooth.
2. Calcariae of *Halictus elliotii* RAYMENT.
3. Fine serrations highly magnified to show position of pollen-granules.

rima; the margins of the segments are much more narrowly reddish; lunar area of metathorax much better defined; tegulae lighter; pterostigma darker; anastomosing rugae of *H. elliotii* diminishes at sides, that of *H. lanarius* is coarse throughout. The hind spur of *H. lanarius* has one prominent rounded tooth, and a wavy edge diminishing to the point; tarsi darker.

On many specimens of bees I have noted the fine serrations holding pollen-granules, and, since a minute examination reveals some relationship between the diameter of the granules and the size of the teeth, I suggest that one of the

spurs is used on the floral pollen-sacs. The coarse teeth of the other spur are undoubtedly used for excavating soil, and I often find small pebbles wedged tightly between the tooth and the spur. True excavators of earth have coarse teeth on one spur, but those using shafts or cells made by others, have fine serrations on both calcariae. The honey-bee, *Apis*, has lost even the serrations, and has only a simple smooth peg; of course, she has no digging to do. Male bees do not excavate, and none has the coarse teeth on the calcariae.

Family Andrenidae. Subfamily Halictinae.

PARASPHECONES HIRTIVENTRIS, Cockerell.

The type collected by Turner was described from Ararat, Victoria, and the Cann River specimen is not quite typical, and perhaps is an eastern race.

PARASPHECONES RUPIFARSUS, n. sp.

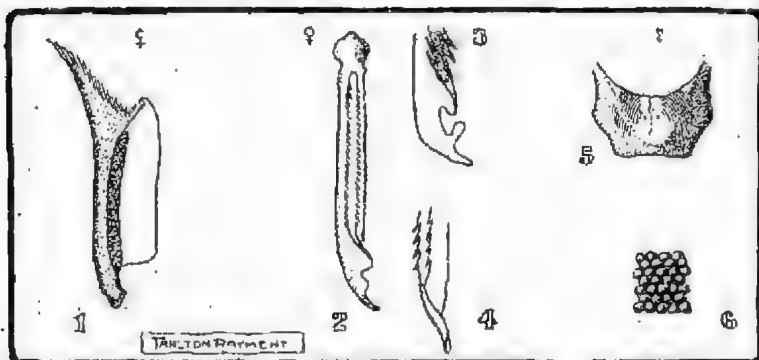
Female.—Length, 11mm. approx. Head black, bright, facial quadrangle wider than long; face-marks nil; a fine carina reaches more than half-way to median ocellus; frons shining, coarsely and densely punctured, a few fulvous hairs radiating from bases of antennae; clypeus shining, prominent, coarsely but sparsely punctured, a fringe of golden hair on anterior edge; supraclypeal area prominent, shining, coarsely but sparsely punctured; vertex with numerous finer punctures, a few fulvous hairs; compound eyes blackish, slightly converging below; genae slightly aeneas, well punctured, a few long whitish hairs; labrum black; mandibulae black, and strongly bent; antennae submoniliform, dark reddish, scape lighter at base and apex. Prothorax is prominent, with a lunate thick tuft of deep cream hair; mesothorax black, bright, well punctured, a few short fulvous hairs; scutellum sculptured and coloured like mesothorax; postscutellum rough, black, covered with a scale-like pattern on which is superimposed a striate sculpture too fine to be called rugae. Abdomen: dorsal segments, black, bright, well punctured, numerous short, appressed black hairs, a few longer fulvous hairs at sides, a few short creamy hairs at hind margin of second; rima, a bare reddish furrow; ventral segments black, a light fringe of long white hair on margins. Legs red, anterior femora and all coxae black, apical ends of median and hind femora darker anteriorly, with black hair, otherwise the hair is pale. Tarsi dark red, with fulvous hair. Claws blackish-red, pulvilli large. Hind calcariae reddish-amber, with three short noduliform teeth at apical end, of a form nearer to *Nomia* than *Halictus*. Tegulae clear ferruginous. Wings dark, reddish-brown, carrying much fine black hair:

nervures reddish-black, basal, like fish-hook curve, just short of nervulus, first and second recurrents entering the cubital cells just short of the second and third intercubitus; cells: radial large, radius nervure rounded on costa, second cubital cell narrowed at top. Pterostigma large, obscure reddish-brown. Hamuli thirteen in number, strongly developed.

Locality, Cann River, Gippsland, Victoria. Date, November, 1928.

Allies: the smaller *P. plorator*, Ckll., has black legs, and the sculpture of the face is quite different. The spurs lack the coarse teeth. *Halictus franki*, Friese, also has some affinity, but the first recurrent nervure meets the second intercubitus. *H. littleri*, Ckll., has white pubescence at bases of second and third tergites.

Biological data. This female was collected from flowers of



1. Antenna-cleaner of female *Parasphecodes rufitarsus* RAYMENT. Note the long, spined malus of Halictine form.
2. Hind spur or Calcaria shows some affinity to *Nomia*. The noduli-form teeth at tip are not typical of *Halictus*.
3. A lateral view of the apical end of spur.
4. Another view to show the twist of the end.
5. Metathorax showing position of the Striae-superimposed on a fine sculpture.
6. The peculiar scale-like pattern of the integument highly magnified.

a *Leptospermum*, and the species is on the border line of *Halictus* and *Parasphecodes*; owing to the structure of the metathorax and the calcariae, I have added it to the latter genus. Type in Melbourne Museum.

Family Andrenidae. Subfamily Nominiac.

NOMIA GRACILIPES, Smith.

This species has been recorded from Victoria, South Australia, and Queensland, but I suspect there are plenty in New South Wales, since Mr. Clark's locality is close to the border. The specimens from the Cann River have more hair, and are slightly larger than those recorded in the original

description; the hair of the legs being lighter than that on specimens identified by Prof. Cockerell.

DIVISION XYLOCOPIFORMES.

Family Ceratinidae.

EXONEURA HAMULATA, Cockerell.

Previously recorded from Queensland, where it was collected by Mr. Hacker. The Cunn River females are typical, with the exception of a triangular black patch on first segment, and since there is some variation in this colour patch, I do not attach any importance to it.

EXONEURA CONGINNULA, Cockerell.

Previously recorded from New South Wales. Both these bees are now added to the Victorian fauna.

Nota bene: The specific descriptions have been systematized, and I shall use this form for all future work. The nomenclature of the cells and nervures of the wings is based on the arbitrary method of Rohwer and Gahan (1916). Systems based on homologies with the veins in other orders are too cumbersome for use in taxonomy.

DR. J. A. LEACH.

The late Dr. J. A. Leach was elected a member of the Club in December, 1902. Four years later he was elected to the committee, and later was one of the vice-presidents, becoming president in June, 1913. However, finding his departmental duties called him so much away from Melbourne, he resigned the position after only two months' occupancy, Mr. J. A. Kershaw being elected to fill the vacancy. In March, 1904, he read a paper concerning the spreading of the Anophelex mosquito in Victoria. This form helps to spread the malarial fever of the tropics, but, fortunately, up to the present, it seems to have had no effect on the health of Victoria.

In December, 1906, Dr. Leach took the principal part in the organization and management of a camp-out at Mornington, where some 30 members of the Club were joined by about 50 school teachers. Axioms to improve their knowledge of nature study, they lived under canvas for about ten days of their Christmas holidays. It was a most successful gathering, and its doings are fully detailed in the *Victorian Naturalist* (March, 1907, Vol. XXIII, p. 185).

Dr. Leach's principal study, however, was native bird-life, and in July, 1909, a "Descriptive List of the Birds of Victoria," from his pen, was issued by the Education Department of Victoria. In 1910 he gave an illustrated lecture on the Birds of Victoria (*Victorian Naturalist*, Vol. XXVII, p. 143), which was later expanded into that well-known volume, "An Australian Bird Book (1911), in which every Victorian bird was illustrated. This contained 20 colored plates. The book was at once a great success, and has passed through seven editions. Again, the Education Department gave considerable help in the production. In 1922 Dr. Leach placed before nature lovers "Australian Nature Studies," a volume of 500 pages, with a large number of illustrations and diagrams. For a reference to its contents see *Victorian Naturalist*, Vol. XXXIX, p. 96. Later he found increasing duties necessitated the relinquishment of his membership, but at the time of his death he was again a member, and had recently attended some of the monthly meetings.

REPORT ON LAND SHELLS FROM CANN RIVER,
VICTORIA.

By C. J. GABRIEL.

Although primarily in quest of insect life, it was fortunate, and with gain to the knowledge of our molluscan fauna, that Mr. Clark was able to devote a little time searching for land shells. This locality, so far as the writer is aware, had not been previously worked, and our pioneer derives some satisfaction from the fact that the collection, though small, proves of more than usual interest, since the five species, each representing a genus, include a form, herein described, new to science.

The area traversed was small and in some parts almost inaccessible, being difficult to negotiate through the presence of a thick undergrowth. Hidden under decayed timber and bark, the specimens were located in damper and denser portions on the river bank. It is certain, with more time at one's disposal, this would prove a happy hunting ground for the conchologist, and I feel confident that further species remain undiscovered, and merely await collecting.

One pleasing feature is the establishing of the exact Victorian locality for *Flammulina excoelsior*, described in 1896 by the late Mr. Charles Hedley. The type occurred at Mt. Kosciusko, and in his observations the author remarks: "In a bottle with *Cystopella*, but without locality more precise than Victoria. Prof. W. Baldwin Spencer has sent me examples of this species in spirits." Again, in 1912, in collaboration with the late Dr. James C. Cox, Mr. Hedley remarks: "It is likely that the unlocalized Victorian specimen obtained by Professor Spencer, and referred to in the original description, came from some neighbouring alpine district." Its distribution is further extended in a mutilated example obtained at Lilly-pilly gully, Wilson's Promontory, by our Club member, Mr. E. S. Hanks.

A displeasing feature is the discovery of a naturalised form, the well-known British species, *Hydrobia* (*Euconulus*) *fulva*, Muller; it is apparently well established, introduced, no doubt, through the agency of man. The naturalizing of these exotic forms is a matter for much regret, already several species representing various genera being on record as having taken up their residence in Australia. A suggestion that *H. fulva* may have reached here in parcels of grain seeds appears to have weight, as European grasses are known to exist at Cann River and other Gippsland districts. My best thanks are due to Mr. Clark for granting me the privilege of studying

this interesting collection, and I am further indebted to him for the careful preparation of the figures; it is no easy task photographing these minute shells.

All the species, with the type, are in the collection of the National Museum, Melbourne.

GENUS RHYTIDA ALBERS, 1860.

Rhytida ruga, Cox, sp.

1871—*Helix ruga*, Cox, in Legrand coll., Mon. Tas. Land Shells, sp. 24, pl. 1., fig. 5.



1882—*Helix exoptata*, Tate, T.R.S.S.A., Vol. IV., p. 75.

1903—*Rhytida* (*Eurhytida*) *ruga*, Cox, Moellendorff and Kobelt, Conch. Cab. (Agnatha), p. 29, pl. 5, figs. 10-12.

1912—*Rhytida ruga*, Cox. Cox and Hedley, Mem. Nat. Mus. Melb., No. 4, p. 7.

Loc.:—Cann River, under decayed timber. (J. Clark.)

Obs.:—Size of type—Maj. 9, min. 8, height 3mm. This species is one of our commoner forms, being generally distributed throughout the State. Comparison may be

made with *Rhytida lampra*, Reeve, and *R. lamproides*, Cox. From the former, it is immediately separable by its finer sculpture, and from the latter by the absence of a bluntly angular periphery, which is so characteristic of that species. Consistency of contour is not apparent, as the Cann River examples are a trifle higher in the spire.

GENUS FLAMMULINA, Von Martens, 1873.

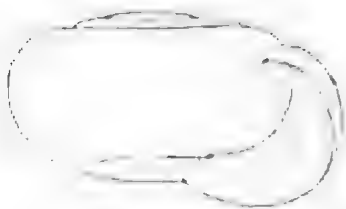
Flammulina excelsior, Hedley.

1896—*Flammulina excelsior*, Hedley. Rec. Aust. Mus., Vol. 2, p. 103, pl. 23, figs. 2-4.

1912—*Flammulina excelsior*, Hedley. Cox and Hedley, Mem., Nat. Mus. Melb., No. 4, p. 11.



Text fig.—*Hyalinia* (*Euconulus*)
fulva, Muller, sp., from Cann
River, Victoria.



Text fig.—*Allodisens cann-*
fluviatilis, sp. nov.

Loc.:—Cann River, under decayed timber. (J. Clark.)

Obs.:—Size of type—Maj. 9, min. 8, height 6mm. The author remarks: 'This very fragile shell of a group hitherto unrecorded from Australia seems in shape to be nearest allied to *F. cornea*, Hutton, from Auckland, New Zealand, from which its size, colour, and perforation distinguish it.' The angular brown flames of irregular pattern serve as a useful recognition mark. See preface for further remarks.

GENUS CHAROPA ALBERS, 1860.

Charopa tamarensis, Petterd, sp.

1879—*Helix tamarensis*, Petterd, Mon. Tas. Land Shells, p. 30.

1893—*Charopa tamarensis*, Petterd. Billingham, Vic. Nat., Vol. X., p. 62.

1894—*Endodonta tamarensis*, Petterd. Pilsbry, Man. Conch., Vol. IX., p. 35.

1894—*Flammulina tamarensis*, Petterd. Pilsbry, Man. Conch., Vol. IX., p. 338.

1912—*Endodonta tamarensis*, Petterd. Cox and Hedley, Mem. Nat. Mus. Melb., No. 4, p. 10.

Loc.:—Cann River, under decayed timber. (J. Clark.)

Obs.:—Size of type.—Maj. 6, min. 5, height 2mm. This species enjoys a rather interesting distribution, having been traced from its type locality, Tasmania, to many parts of Victoria, and as far north as Mt. Kosciusko, where Hedley records it from Wilson's Valley, at an altitude of 4500 feet.

GENUS ALLODISCUS, Pilsbry, 1892.

Allodiscus cannuviatilus, sp. nov. figs. 1, 2.

Shell minute, thin, fragile, light brown colour, faintly shining, subdiscoidal, ribbed, narrowly umbilicate. Whorls about four and one-half, including a strongly spirally-striate protoconch. The succeeding whorls are narrow, moderately convex, regularly increasing, the last descending considerably below the level of the penultimate. Sutures deeply impressed. Sculpture consisting of subequidistant, radiate, nearly straight ribs, to the number of about 75 on the body whorl; these traverse the base and may be seen entering the umbilicus; interstices microscopically reticulated by fine growth lines and spiral striae. Bordering the umbilicus, several rather strong spiral lirae are evident; this is a constant feature, and may serve as a useful recognition mark. Aperture rotundly lunate, slightly oblique. Peristome thin, sharp, regularly rounded. Several ribs in front of aperture covered by a shining callus glaze. Dimensions of type.—Maj. 2.8, min. 2.4, height 1.7mm.

Loc.:—Cann River, under logs. (J. Clark.)

Obs.:—The novelty approximates *Helix olivayensis*, Pottard, from which it may be distinguished by its fewer ribs, and the presence of an umbilicus. Type, in Nat. Mus. Melb.

NATURALIZED SPECIES.

GENUS HYALINIA, Charpentier, 1837.

SUB-GENUS EUCONULUS, Reinhardt, 1883.

Hyalinia (*Euconulus*) *fulva*, Muller, sp., figs. 3, 4.

1774—*Helix fulva*, Muller, Hist. Verm., pt. 2, No. 249.

1853—*Helix fulva*, Muller Forbes and Hanley, Hist. Brit. Moll., Vol. IV., p. 75, pl. 118, figs. 8, 9.

1854—*Helix fulva*, Muller. Reeve, Conch. Icon., pl. 122, fig. 732.

1862—*Zonites fulvus*, Muller. Jeffreys, Brit. Conch., p. 171.

1914—*Hyalinia* (*Euconulus*) *fulva*, Muller. Taylor, Mon. Land and F.W. Shells. Brit. Isles, p. 118, figs. 458, 159 (in text), pl. 2, one figure, pl. 15, three figures.

1922—*Euconulus fulvus*, Muller. Watson, Journ. of Conch., Vol. XVI., No. 9, p. 282.

Loc.:—Cann River, under decayed timber. (J. Clark.)

Obs.:—Compared with specimens from Keswick, England.

This is a microscopically, delicately-sculptured little species, and with its glossy and almost imperforate character may not be confused with any Victorian form. A rather large synonymy exists, which is fully dealt with by Taylor (loc. cit.). It is certain to be rediscovered, and to aid in its identification, the following description is here presented:—

Shell minute, globose, turbinate, subperforate, thin, semi-transparent, uniform yellowish horn-colour, smooth, shining, spire elevated, apex rather obtuse. Including protoconch whorls about $5\frac{1}{2}$, narrow, convex, slowly increasing, the ultimate whorl well rounded. Sutures deeply impressed. Beneath a strong lens, an extremely minute sculpture is revealed, which consists of exceedingly fine radial riblets crossed by microscopic striae, the riblets being traceable almost to the extreme apex, but are less prominent on the base.

The base is smooth, very shining, and under high power exhibits spiral striae, which appear fainter than the radial riblets. Aperture slightly oblique, lunate, transverse. Columella subvertical. Peristome simple, thin, sharp, not reflected except upon the columella lip. Inner lip lightly callous, reflexed, almost concealing the narrow perforation. Dimensions.—Maj. 2.8, min. 2.6, height, 2.2mm.

EXCURSION TO HEATHMONT.

Favoured by a fine day, a good party of members and friends met the leader at Heathmont, on August 17. Our first find was a patch of the Nodding Greenhood Orchid, *Pterostylis noddiana*. This species is one of the easiest to grow, and it would be interesting introduction to the Club's native flower border at Wattle Park. It was soon found that the cold winter had greatly retarded the flowering of *Epacris* and the Myrtle Acacia, which are usually the features of this outing. However, enough was seen to give some idea of the display a more favourable season would make.

In trying to remove some small plants of the Silver Wattle, *Acacia dealbata*, from their home near the Dandenong Creek for home cultivation, surprise was created when it was found that the majority were merely suckers from long roots just below the surface, instead of seedlings, as expected. The native Indigo, *Indigofera Australis*, was crowded with buds, and in a few days would make a fine display, but it is a bush that must be seen *in situ*, the flowers having no lasting properties. Colonies of two species of sawflies were boxed for possible rearing at home by an ardent entomologist.

F. G. A. BARNARD.

THE BRUSH-TAILED PHASCOGALE.

By DAVID FLEAY.

The Tuan or Brush-tailed Phascogale, *Phascogale penicillata*, though widely distributed in Australia, is scarcely a well-known animal. Towards the end of March, 1929, I was fortunate in obtaining a splendid male specimen in the Newstead district, near Castlemaine, Victoria.

During the past six months, the fierce little creature has revealed a number of his interesting habits. I have had a long experience of both the yellow-footed and Swainson's species, and knew that their movements were extremely rapid, but the speed of the Tuan is amazing.

The long black tail brush is seen to advantage in swift leaps, when it bristles stiffly, and helps the animal to maintain his balance. Doubtless, many a sudden leap on unsuspecting victims allows the little killer to obtain a tenacious grip.



Moving with the characteristic jerky motion of the family, the wary marsupial is sometimes abroad in the daytime, enjoying the warmth of the sun. Fresh food, in the form of dead sparrows, is always welcome, and, in addition to removing the heart, lungs, and liver, the Tuan seldom neglects the brain. The common house-mouse is, apparently, first favourite as a dinner dish, and after a rapid "scrunching" of strong jaws, the corpse disappears—hair, bones and tail together.

It is most difficult to obtain a secure grip on this rat-sized creature, and one hand alone would result in a severe bite. My animal has already sunk his teeth with telling effect through a forefinger and trouser-leg! When he commences an ominous "churr-r-r," it is time to make sure of one's grip, or replace him in the cage. One day the Tuan became

a raging fury, when imprisoned in a small calico bag, and the slightest movement near at hand was sufficient to cause the bundle of pugnacity to jump in that direction.

More numerous in the days before the scourge that took heavy toll of so many of the Dasyuridae, the Brush-tailed Phascogale is not a common animal; but when present—especially in the vicinity of a farm—his work is sometimes seen in the shape of a dead fowl. One of my bush friends tells of frequent visits, in bygone years, from a Tuan; and, as he says, the “hurry-up” given to sleeping starlings in the roof was a thing to be remembered.

Recently a dead specimen was forwarded to me. It was killed in a rabbit trap, and, apparently, after the mother's death, a number of young ones had been born. Probably finding their way along the hair tracts, the tiny creatures reached the pouch area, but never became attached to the teats. Dissection showed unborn embryos.

It is most unfortunate that this female Tuan blundered to her doom, for quite close to the tree under which she died, a box-trap was set, in the hope of capturing a mate for the “brush-tail” already in my possession.

ALTERATION IN THE NAME OF A CYPRAEA.

By J. H. GATLIFF.

In the *Victorian Naturalist*, Vol. 32, February, 1916, a new variety of an Australian Cowrie was named by me *Cypraea miliaris*, Gmelin, var. *gabrielii* nov. It has been pointed out to me that a fossil had been named *Cypraea gabrielii* by F. Chapman (*Proc. Roy. Soc. Victoria*, 1912, Vol. 25, n.s. Part 1, Page 190, Plate 13, Figures 1-3), and that, according to the International Rules of Zoological Nomenclature, Article 11. “Specific and sub-specific names are subject to the same rules and recommendations, and from a nomenclatural standpoint they are co-ordinate, that is, they are of the same value.”

I, therefore, substitute the name *Cypraea miliaris*, Gmelin, var. *gabrieliana*, Gatliff, for the name *Cypraea miliaris*, Gmelin, var. *gabrielii*, Gatliff.

In the *Journal of Conchology* (No. 11, Vol. 18, July, 1929, Page 316), H. C. Fulton gives a short paper, “Notes on the Named Varieties of *Cypraea miliaris*, Gmelin.” He gives five varieties, the fifth being:—“5, *Miliaris* v. *gabrielii*, Gatliff and Gabriel, Hab. Victoria”: thus making two errors, as Gabriel had nothing to do with that paper, and the habitat given in it is Northern Territory, Australia.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, on Monday, October 14, 1929. Mr. Geo. Coghill (vice-president) occupied the chair, and there were about 120 members and visitors present.

The Chairman alluded feelingly to the recent deaths of Dr. J. A. Leach and Mr. A. J. Campbell. Both of these gentlemen were recognised as leading ornithologists, and had rendered invaluable service to the club during their memberships.

REPORTS.

Reports of excursions were given as follows:—Heidelberg, Pond Life, Mr. J. Wilcox; Croydon, Insects, Mr. V. H. Miller, for Mr. F. E. Wilson, F.E.S.; Macedon West, General, Mr. A. J. Tadgell; Bayswater, Botany, Mr. J. W. Audas, F.L.S.; Kinglake, Botany, Mr. P. F. Morris; Wattle Park, Shrub Planting, Mr. F. G. A. Barnard, for Mr. E. E. Pescott, F.L.S.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As ordinary member: Mr. J. L. Gorman, Coburg; and as associate member: Miss Kathleen Thomas, Windsor.

GENERAL.

The Chairman announced that Mr. I. Searle had presented six stereoscopes for the use of the Club, and Mr. H. Dickins had given a copy of his illustrated book on Victorian orchids for the library. A vote of thanks was accorded to these members.

LECTURE.

Mr. P. F. Morris gave an interesting and instructive lecture entitled "Facts About Fishes," dealing with some of the commoner species of fresh and saltwater fishes and edible crustaceans. The lecture was illustrated by numerous lantern slides, and also by spirit specimens exhibited by Mr. I. Searle.

EXHIBITS.

By Miss D. Kidd, B.A.—Web of Bag Moth, *Teara* sp. from South Australia.

By Miss G. Nokes.—Sprays of *Eriostemon myoporoides*.

By Miss E. Hart.—Growing orchid, *Sarcophilus falcatus*.

By Mr. W. H. Ingram.—Mounted Seaweeds from Port Macdonald.

By Mr. A. E. Rodda.—Photo enlargements from negatives of nests and eggs; by the late Mr. A. J. Campbell.

By Miss S. Fullerton.—*Chiloglottis Gunnii*, Common Bird Orchid, from Glenmaggie.

By Mr. C. Daley, F.L.S.—Specimens of plants gathered on the Black Range, Western Grampians. *Eriostemon gracile*, *Conospermum Mitchellii*, *Prostanthera rotundifolia*, *Micromyrtus ciliatus*, *Dodonaea cuneata*, *Calectasia cyanea*, *Anthocercis myosotidea* and *Grevillea alpina*.

By Mr. J. Searle.—Specimens of Fishes and Crustaceans from Port Phillip, including a species of Angler-fish *Antennarius striatus* now recorded for the first time in Victoria; also micro-mounts of Fish ova and larvae.

By Mr. C. J. Gabriel.—Marine shells: *Callanaitis disjecta*, Perry, Victoria; *C. Yatei*, Gray, New Zealand; *C. Calophylla*, Hanley, New South Wales; *C. Plicata*, Gmel, West Africa. Also introduced Land Snail Shells, *Cochlicella acuta*, Muller, from England.

By Miss J. W. Raff, F.E.S.—Living Antlion larvae, from Cairns, Queensland.

By Mr. C. G. Hodgson.—Cultivated specimens of *Grevillea asplenifolia* and *G. oleoides*.

By Mr. G. Coghill.—Cultivated specimens of *Grevillea rosmarinifolia*, *Prostanthera Sieberi*, *P. nivea*, *Eriostemon myoporoides*, *Tecoma australis*, *Micromyrtus ciliatus*, *Leptospermum laevigatum* and *Chamaelaucium uncinatum*.

By Mr. W. H. Nicholls.—Water colour drawings of some Australian orchids, including *Pterostylis Rogersii*, Coleman, and *Thelymitra variegata*, Lindley, just re-discovered at Hall's Gap, Grampians, by Mr. A. B. Braine.

EXCURSION TO WEST KINGLAKE.

Twelve members and friends took part in the excursion to West Kinglake. The weather was perfect—a typical Victorian spring day. The motor cars were left at Tommy's Hut, and the party journeyed along the road towards Kinglake. About one mile from the road, on the south side, a gully was investigated. Here 12 species of ferns were observed, the chief being *Blechnum discolor*, Fishbone Fern; *B. capense*, Soft Water-Fern; and *Polystichum aculeatum*, Common Shield Fern. The fusion of the trunks of *Todea barbara*, King Fern, and *Alsophila australis*, Rough Tree-Fern, was observed for the first time by each member of the party. About 20 species of phanerogams were observed in flower.

Birds were fairly plentiful and we were interested in many of the observations made by Mr. W. Ingram. A fight between a Magpie and a Kookaburra for ownership of certain territory, resulted in victory for the former. A return was made to Tommy's Hut, and a further walk in a westerly direction was much enjoyed. At a large water hole many birds were observed, the most interesting being Butcher-bird, Cuckoo-Shrike, Pallid Cuckoo, and Currawong. Thanks are due to Mr. Woodfield for the courtesy which he extended to the party.

P. F. M.

A NEW SPECIES OF THELYMITRA.

By W. H. NICHOLLS.

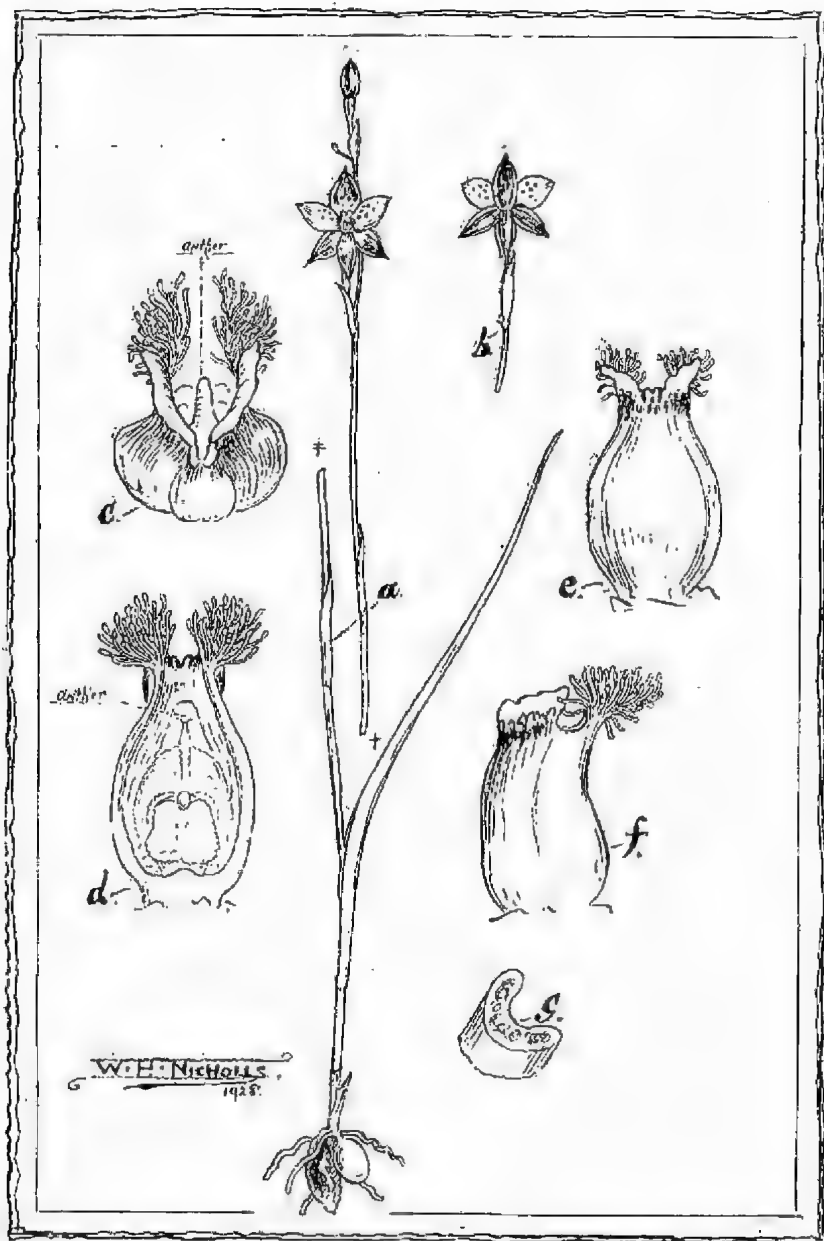
Thelymitra Merranae, n.sp

Planta terrestris, gracilis, glabra, 15-28 cm. alta. Folium sub-erectum, angustum, lineare, canaliculatum, circiter 8 cm. longum, Bracteae caulinae 2, parvae, vaginantes, subulatae. Flores 1-3, raro 4, circiter 12-17 mm. in diametro; pedicelli graciles. Ovaria sub-gracilia, teretia. Segmenta perianthii elliptica, oblongo-elliptica vel ovata; petala et sepalum dorsale subaequalia, circiter 10 mm. longa. 5 mm. lata, maculosa, more *T. ixioides*, Sw.; sepala lateralibus et labellum 9 mm. longa, 4 mm. lata, segmentis ceteris angustiora. Columna erecta unicolorata, circiter 4 mm. longa, basi purpurea; lobus medius flavus, trifidus, marginibus paululo dentatis superne dilatatis; lobi laterales penicillati. Anthera apice obtusa. Stigma quadrangulare.

A very slender plant 15-28 cm. high. Leaf sub-erect, narrow-linear, widely channelled (in all the specimens so far examined), reaching to about the middle of the very slender stem sheathing at the base. Stem-bracts 2, closely sheathing, subulate, the lower bract about $2\frac{1}{2}$ cm. long, the upper bract a little shorter. A small scarious bract at the base of the plant. Tubers ovate or oblong-ovate. Flowers 1-3, rarely 4, purplish-blue, about 12-17 mm. in diameter. Ovary narrow, elongated, with a small acute bract below the short slender pedicel. Perianth segments elliptical or oblong-elliptical or ovate, dorsal sepal and petals spotted as in *T. ixioides*, Sw., sepals with a broad purplish stripe on the outside, lateral sepals and labellum narrower than the other segments. Column erect, about 4 mm. high, purple, with the wings yellow, somewhat vase or jug shaped, not hooded; the mid-lobe tripartite, expanding outwards at the summit, forming thus a V-shaped orifice, higher towards the front. Margins very slightly dentate interlobule bifid; lateral lobes erect, hair-tufts white, projected upwards and outwards, reaching just above the wings. Anther prominent with a blunt point projected forward and over the pollinia. Stigma quadrangular, comparatively small, wider at the base, rostellum large, ovate, situated in the upper depressed margin of the stigma.

I have named this small-flowered, beautiful sun orchid after Mrs. Merran Sutherland, of Mogg's Creek, Airey's Inlet, Victoria. From her much valuable material has been received, having been collected in the extensive forest area between Airey's Inlet and Lorne. Concerning the new species of which she is the discoverer, Mrs. Sutherland writes as follows:—

"It grows in the fine sandy soil that is usual between Airey's Inlet and Mogg's Creek, in the marshy parts chiefly, also in some spots along the old bush road, on a rise just below the 300 foot red sand hill, where they get all the seepage. It is not plentiful.



A New Sun Orchid.—*Thelymitra Merranae*, n.sp.

but is well distributed over the aforesaid area. It seems quite as happy in the open in swampy heath land as it does in swampy land under trees. The flowers expand on sunny days with a temperature of about 80 degrees Fahr. in the shade."

The general appearance of this orchid might cause it to be mistaken for small forms of *Thelymitra ixioides*, Sw., which it resembles closely; this is heightened by the fact of the upper perianth segments being spotted. Its nearest affinity, however, seems to be *Th. truncata*, Rogers (a South Australian species). In *truncata* the petals only are spotted; the truncate hood (or lobe) of the column is composed of a single glandular lobe, whereas in the new species the mid-lobe is tripartite, also widely divergent. On the other hand, when the flowers are closed, the new species may pass for *Th. pauciflora*, R. Br., or one of the other small-flowered forms, the flowers of which, as in the new species, open only during sunny or humid weather.

Airey's Inlet, October, 1927, 1928, Mrs. M. Sutherland.

(A type specimen is preserved in the National Herbarium, Melbourne.)

Explanation of Plate.

- (a) A. Typical Plant, approximately $\frac{1}{2}$ natural size.
- (b) A. Flower from rear, approximately $\frac{1}{4}$ natural size.
- (c) Column from above, much enlarged.
- (d) Column from front, much enlarged.
- (e) Column from rear, much enlarged.
- (f) Column from side, much enlarged.
- (g) Section through Leaf.

EXCURSION TO BAYSWATER.

Taking advantage of the fine day, 17 members spent a pleasant and profitable time at Bayswater on September 28. Although rather early for most of the spring flowers, the number of species recorded (45) was very fair. From Bayswater Station the party walked in a northerly direction for about a mile, crossed the railway enclosure and diverged in a westerly direction. At the Dandenong Creek we obtained a good view of *Acacia dealbata*, Silver Wattle, displaying its wealth of beautiful bloom, along the banks of the stream. Other *Acacias*, such as *A. stricta*, *A. melanoxylon*, *A. armata* and *A. myrtifolia* were in full bloom.

Everywhere the *Pultenaea Gunnii*, Golden Bush Pea, was met with, displaying its gorgeous blooms, while its relative *Hardenbergia monophylla*, with bright purple flowers, was equally conspicuous. Several fine specimens of the *Drosera Planchonii*, Climbing Sundew, were examined, and found to have many minute insects captured by their leaves.

Three species of Guinea flower, *Hibbertia stricta*, *H. sericea* and *H. linearis*, made a fine show. The search for orchids was rewarded by the finding of 13 species viz:—*Thelymitra antennifera*, Rabbit-ears, *Caladenia dilatata*, Fringed Spider Orchid, *C. congesta*, Black Tongue *Caladenia*, *C. Patersonii*, Common Spider Orchid, *Glossodia major*, Wax-lip Orchid, *Diuris maculata*, Leopard Orchid, *D. pedunculata*, Snake Orchid, *D. longifolia*, Tall *Diuris*, *Cryptostylis leptochila*, Small Tongue Orchid, *Pterostylis alpina*, Alpine Greenhood, *P. nutans*, Nodding Greenhood, *P. pedunculata*, Maroon-hood, *Lyperanthus suaveolens*, Brown-beaks.

J. W. AUDAS.

THE GOLDEN AVENGER.

By L. G. CHANDLER.

It will surprise many people, other than naturalists, to learn that there are insects that prey upon spiders. Yet, such is the case, and these foes of the spider, the avengers of the insect world, are fearless in their hunting tactics. They include in their ranks a big group of solitary wasps, and there is one—the giantess of her race in my district—that I wish to draw attention to. You will note that I use the feminine gender. It is the females of the wasp-tribe that do the hunting and all the laborious work that is necessary for the welfare of the race. The males are usually diminutive fellows that spend their brief lives in flirting and sipping the sweets from the flowers.

The same rule applies more or less to spiders, and therefore it is usually the female spider that is selected by the wasp. The wasp whose habits I would describe is about $1\frac{1}{4}$ inches in length, with rich orange and black markings and orange wings. My friend, Mr. F. E. Wilson, has identified a specimen as *Salix tuberculatus*. It had been placed at one time in the genus *Pompilius*, but in the National Museum the generic name is now *Salix*. Mr. Wilson states that the species varies considerably in size. I mention this because I have had a similar, but much smaller wasp, identified under the same name. However, the habits of this wasp are different in many details.

Before I found the correct name of the big wasp I usually referred to her as the "golden avenger." She is a lovely creature, a very Queen of her tribe. Stately and sedate in her movements, she is the very antithesis of most members of her genus, that are forever rushing about their task in eagerness and haste. She displays but little nervousness, and I can watch at close quarters without fear of disturbing her. The big field spider, usually called wolf spider, is her special prey, and she searches in her hunt every nook and cranny.

What of the spider, the bold, fearless hunters of helpless victims? With her poison fangs she should be more than a match for my dainty wasp. I expected to see some terrific battles between spider and wasp when I began to study their habits, and thought that perhaps the victory would sometimes be with the spider. I was hopelessly out in my predictions. With her insect prey at her mercy in the web or in the field, the spider is very bold and brave. But suddenly faced with her wasp enemy, her attitude is one of abject terror. She appears incapable of defence, and her main desire is to run and hide.

Except in places where the spider may be firmly entrenched and beyond the reach of the poison sting of the wasp, the latter

attacks her apparently dangerous adversary without hesitation. It may be that in an entrenched position the wasp awaits a favourable opportunity to seize the spider by a leg and jerk it from its lair. In the open it would be at her mercy. I have not had the good fortune to witness a combat of this description, where the spider would appear to have a good fighting chance. From the utter fearlessness of this species in her attack on a spider in the open, I believe she would not hesitate to enter a hole to capture her game.

One day, at six p.m., I was walking through an orange grove, when I came upon my wasp attempting to capture a big wolf spider. The spider, whether by accident or design, had taken up a position standing on the tips of its tarsi, over a line of small, black ants. Each time the wasp approached, the ants clustered upon her legs, and she had to beat a hasty retreat to dislodge them. It was apparent to me that the spider was quite safe, and as I was anxious to witness the method of attack, I disturbed it. With a rush it ran a few yards and stopped with the wasp close behind. The latter, with flickering wings, now walked around the spider in slowly lessening circles. As it came closer the spider drew itself up on extended legs. Then a most unexpected thing happened. Throwing herself on her back behind the spider the wasp wriggled and twisted until she was beneath its body, and curving her abdomen, she attempted again and again to use her sting. But as often the spider, by pushing with her legs and standing a little higher, managed to evade the end. The wasp now went to the front of the thoroughly cowed creature, and dropping on her back right under those powerful shining fangs, continued the attack from this position.

One quick slash from those deadly fangs and the fight would be over. Instead, I see the spider feebly pushing her relentless enemy away with her front legs. Several times, at an opportune moment, the spider bolted for safety, but there was no escaping from that tenacious avenger, and the same procedure was repeated. Once the spider got away before the *Salix* could regain her feet, and hid in a crevice in the ploughed land. For several minutes the now excited wasp circled around the locality, and searched on foot. Finally she came upon the half-hidden quarry, and without a moment's hesitation mounted upon its back, and as the spider lifted its legs to push her away, like a flash the sting was inserted, apparently at the base of the front right leg. The big creature crumpled up, paralysed!

Having paralysed her game after such arduous toil—a quarter of an hour had elapsed from the time that I had appeared—the wasp settled quietly to her toilet. Her delicate antennae especially were given close attention. She moistened her front feet separately

in her mandibles, and then stroked the antennae to the end. It was interesting to watch the smooth movements as she cleaned the sand from her legs. One middle and two hind legs were cleaned together, and each time the middle leg became disengaged she gave it a dainty shake. The abdomen and wings were in turn well groomed by the hind legs, and the thorax and face by the front legs. To remove the larger particles of sand she rubbed herself along the ground.

After a complete grooming she thrust her tongue between the fangs of her helpless prey and for several minutes sucked at the juices. Presently, grasping a fang in her mandibles, she raised the spider slightly, and stung it about the centre of the thorax. The sucking was resumed, and again the spider was stung somewhere in the thorax. There were then long periods of stillness, when her only movement was an in and out pulsing of the abdomen. Ants were driven off savagely, and three times she moved her prey a few feet, and at each halt rested or groomed herself.

At 7 p.m. she started up with energy, and grasping the spider by a fang, and walking backwards, she dragged it up and down furrows over the ploughed land, and under vine trellises for a distance of thirty yards. Leaving her prey, she rose into the air, and disappeared over the vines. In a few minutes she was back, and resumed the dragging at a different angle. This flight was undoubtedly to survey the route and possibly to inspect the burrow.

On two more occasions, after about 10 yard journeys, she made these flights of inspection. Darkness was now settling down, and on returning after her last flight no time was lost in dragging the spider across the next land, when, leaving it two feet from the burrow, she went below. Coming up, she hauled her victim a foot closer, and again descended. This extraordinary procedure was repeated for a third time, and the spider left at the entrance. Finally it was hauled out of sight. One hour and forty-four minutes had elapsed from the time that I had first observed her. I waited another twenty minutes, when it was almost dark, and as she did not re-appear, it was evident that she intended to spend the night in the burrow. Her backward course over ploughed land and under heavy vine foliage was more than 50 yards. It was remarkable how accurately she kept her course. For the first 30 yards she was bearing a little to the left, but after the flight of inspection she walked backwards almost in a direct line to the nest.

This species of wasp excavates the main shaft of her burrow before she begins the hunt. It goes down to a depth of fifteen inches to two feet, a truly herculean task for a small insect. As she requires them for her prey, a series of lateral cells that radiate

from the bottom, are dug. I have not yet ascertained the exact number of cells a completed burrow would contain. The spiders are stowed away alive, but paralysed. When the young wasp in each cell hatches from its egg, it has living though helpless flesh to consume. An awful fate for the spider, and the death of countless insects has been unknowingly avenged.

EXCURSION TO MACEDON WEST.

Show Day, September 26, brought together a party of 20, including five Gisborne friends, for the excursion to Macedon West. On arrival, Mr. C. Swinburne, J.P., to whom we are indebted for our outing, welcomed us, and later was the means of our entertainment at tea by Mrs. Wiltshire, of Woodside. From the Gisborne railway station we motored along the Calder highway through the Black Forest, rapidly passing tall, black-holed gum trees as we listened to various theories responsible for the sinister name given to the forest, whose darkened shade evidently had a foreboding effect on "old country" settlers of 70 years ago, when herabouts raids were made by bush-rangers from their retreats on Mt. Macedon.

After speeding some miles along the old Blackwood Road, we "went bush," and were soon busy collecting till we reached a running stream, one of the head waters of Jackson's Creek, some six miles out and not more than one and a half miles from the Divide. While resting, Mr. W. Crawford gave us an interesting address on the geological features passed through from the time we had left North Melbourne to our present surroundings, and afterwards conducted portion of the party down stream, where a number of fossils were collected, including an unusual and interesting graptolite *Didymograptus Codrussi*, from the Lower Ordovician Rocks.

Another party roamed the hillside and upstream, where Mr. V. Miller gathered the curious Cape Pond-lily *Aponogeton distachyum*, with its large, oblong, floating leaves, and, as its specific name implies, its scented white fleshy forked or combed perianth is divided into two segments. One regrets that this South African plant, of which there are several Australian sisters, is liable to become a menace in still waters, though Von Mueller, in his "Select Plants," pointed out that the tubers are edible and the succulent flowers afford spinage. Mr. G. Lyell, whose vast collection of lepidoptera is considered by leading experts to be one of the finest in the world, contributed a pleasing talk on local insect collecting and illustrated his remarks by caterpillar specimens taken during this outing.

If the orchid enthusiasts were disappointed, it was remembered that the district, during the past winter, had experienced six falls of snow, and it was a late season here, while we were only three miles from Mt. Macedon. Snow is regarded in this district, as in Continental Europe, to be the forerunner of good seasonal vegetation, and the Messrs. Wiltshire, our guides, promised the party that by October 27 it could gather orchids in handfats. Botanists who did general collecting found 120 species of plants, of which 43 were in flower.

Although one reads on page 34 of "Letters from Vic. Pioneers" that in November, 1844, a severe frost killed "nearly all the beautiful blackwood trees that studded the hills" in the Wannon district of Victoria, herabouts were never seen finer umbrageous specimens of *Acacia melanoxylon*, literally covered with masses of lemon-coloured flowers. *Epacris impressa* in all tints, was abundant. *Hovea heterophylla*, in fine, large, mauve sprays pleased the party, and a local enthusiast brought us the rare white form whose sister, *H. longifolia*, I had also collected in white colour on Mt. Bogong. Birds abounded, and Mrs. V. Miller was able to identify at least 40 species.

A. J. TADGELL.

GEOLOGY OF THE BLACK FOREST AREA.

By W. CRAWFORD.

The Black Forest is situated about two miles south-west of Macedon and near the source of Jackson's Creek. Some features of geological interest seen from the train on the journey from Melbourne to Gisborne are given as well as a brief account of the locality visited. From Footscray to Gisborne, except for a short section at Sunbury, the railway runs over a sheet of basaltic lava, or bluestone, as it is commonly called, which as far as Sunbury has a fairly even slope to the south.

In the neighbourhood of Sunbury and beyond it a great many volcanic hills occur. Within a radius of six miles of Gisborne there are at least a dozen volcanic vents, while probably others are hidden by later volcanic flows. Usually the course of the intermittent streams which run over the bluestone is determined by the edges of the lava flows. Stream sections show that the old surface now covered by the bluestone was uneven, with low hills and deep gullies. South of Red Rock the bed-rock appears at the surface, while a quarter of a mile away a well was sunk to a depth of 360 feet before the bluestone was penetrated. The lava flows are many, and while most of the later flows may be traced to some hill, it is impossible to ascertain the source of the earlier ones, which occupy the lowest depressions of the old surface.

Over a considerable area of volcanic country near Gisborne railway station a layer a few inches thick of concretionary limonite, or buckshot gravel, exists about a foot below the surface. The iron in the limonite during many alternating wet and dry seasons has been leached out of the bluestone by rain water, and on the evaporation of the water has been deposited in a layer near the surface. At Gisborne Racecourse, and several other level areas on the bluestone, the surface is sinking, forming roughly circular, swampy areas, probably owing to leached out material being carried away by water. In such cases the surface does not sink evenly, but in small patches or crab-holes, so gradually lowering the whole.

Two miles north of Sydenham, in the valley of Jackson's Creek, there are the basaltic columns called the "Organ Pipes." Anyone making the journey from Gisborne through Bullengarook to Barchus Marsh may see a good example of basaltic columns by going about 200 yards from the road, to the mouth of a small tributary of the Pyrete Creek, called Cataract Gully, which flows south from Mt. Bullengarook for about three miles over the bluestone before falling into the deep gorge which the Pyrete Creek has cut in the Lower Ordovician rocks to the east of the road. The columns are, on a rough measurement, about 70 feet high.

Jackson's Creek, the valley of which is a conspicuous feature of the landscape from Sydenham to Riddell, has its source to the west of Macedon and its tributary is Riddell's Creek, which brings the drainage of the southern slope of the Mt. Macedon Ranges. For the first few miles it flows over old sedimentary rocks and probably this portion dates back to the pre-newer volcanic period, but the greater part of its course has been determined by the later lava flows, and here it is a young river running in a deep and narrow gorge. Near Gisborne its direct course to the sea was blocked by the volcanic hills, Mt. Gisborne and Red Rock, which arose in its path, and it had to go nine miles east to Clarkefield before again turning south.

In many places the bluestone has been cut through by the stream, and wherever this has occurred lateral erosion has formed a wide river flat. Not all the river flats, however, have this origin. About a mile downstream from Gisborne there is a flat, several acres in extent, at which no bed-rock appears, and it seems that here the creek has cut right through a buried volcano and the loose and slaggy material near the vent has been removed while the creek was cutting slowly downward in the solid bluestone further downstream. Near Sunbury tilted beds of sedimentary rock appear in a cutting and are shown to be of Upper Ordovician age by the graptolites which may be found in the darker layers.

After climbing through the Sunbury cutting, a long stretch of low hills with deep gullies may be seen on the west, and beyond them the level skyline of the bluestone. These hills are composed of old sedimentary rocks, and in some places among them, Upper Ordovician graptolites may be found. But besides the normal Upper Ordovician slates and sandstones, in which graptolites are almost the only fossils, there is a series of sandstones and shales with impressions of brachiopods and corals and crinoid stems and joints. Some of the sandstone is much coarser than that of the normal Upper Ordovician and at one place contains pebbles an inch in diameter. Similar rocks occur extensively near Riddell and to the east and south-east of Gisborne.

In some places graptolites occur in the shales. One of these localities is two miles south-east of Gisborne where a creek crosses the Calder Highway. It is probable that the whole series is a late and shallow water phase of the Upper Ordovician with which it is associated in the field. Passing Clarkefield the distinctive shape of Mt. William, where the aborigines' quarries are situated, may be seen far away in the north. In some of the bluestone in the neighbourhood of Riddell and Gisborne there are great numbers of banded secretions of carbonate of lime, which are very ornamental when shaped and polished.

To the north-west of Riddell there is a large area of rough country in which the rocks are chiefly granodiorite, Ordovician slates and sandstone, and a very hard conglomerate known as the Kerrie conglomerate. The exact age of the Kerrie conglomerate is not certain, but just where the train approaches closest to the hills, about two miles from Riddell, pebbles resembling in every respect the fossiliferous sandstone, which has been described above, may, on careful search, be found in the conglomerate. They occur towards the western end of the section on Riddell's Creek and also loose on the cleared western side of the hill. Several outcrops of the fossiliferous sandstone occur near and the conclusion is that the Kerrie conglomerate is partly formed from and is therefore younger than these sandstones, and it has been proved by previous workers that the conglomerate is older than the granodiorite.

The rocks of the portion of the Black Forest to the south-west of Macedon, recently visited by a party of field naturalists, are of lower Ordovician age. A deep covering of soil and the absence of good sections make much of the area rather uninteresting geologically. A discovery of graptolites was made, however, in the spoil from a trench cut across a gully in Sec. A. 2, near Phillips' Bridge, the more common being *Cardiograptus morsus* and *Oncograptus upsilon*. On a subsequent visit another locality was found 50 yards below the bridge, in badly cleaved hard blue slate, the more common graptolites being *Didymograptus caduceus* (variant forms including var. *manubriatus*) and *Oncograptus upsilon*. Fragments of *Didymograptus v. deflexus*, and others also occur. Further search would probably reveal other forms. The graptolites indicate two zones of the Darriwill subdivision of the Lower Ordovician. Similar or identical beds occur to the south-west in another batch of Jackson's Creek upstream from the Victoria Slate Quarry.

On the left bank of the creek, about three-quarters of a mile downstream from Phillips' Bridge, *Didymograptus caduceus* has been found in full relief in somewhat sandy looking material, in which the very numerous crustaceans are represented by hard nodules resembling pebbles. Still further south, near B.a. 69 and B.a. 71, Lower Darriwill graptolites occur, among them being *Didymograptus caduceus* (including var. *manubriatus* and var. *forecipiformis*), *Oncograptus upsilon*, *Didymograptus v. deflexus*, *Trigongraptus*, *Tetragraptus serra* and *Coniograptus speciosus*. It must have been somewhere in this neighbourhood, although the exact locality is not clear, that that fine example of *Coniograptus speciosus*, now in the National Museum was found. At B 29, near Cobaw S.S., about 12 miles to the north, Darriwill beds outcrop, and they also occur in the railway cuttings between Gisborne and Woodend, and in Woodend. The writer is not aware of any locality between Mt. Macedon and Cobaw, where graptolites have been found. Much

of the intervening country is covered with igneous rocks and deep soil, but there is a lithological similarity in the bedrock wherever it is exposed, throughout the area, which makes it probable that the whole is of Darrivill age.

In the Pyrate and the Djerriwarrh Ranges, a few miles to the south of Macedon, the country is more broken. *Oncograptus* beds and *Tetragraptus fruticosus* beds outcrop within a fraction of a mile of each other, and at one place Upper Ordovician within 150 yards of *Didymograptus bifidus* beds.

EXCURSION TO SOUTH MORANG.

This excursion took place on September 7, and was attended by 25 members and friends. The fresh day was an ideal one for walking, and the Plenty and Kinglake Ranges, in the near distance, contributed to the interesting surroundings. Two introduced plants, the Field Marigold, *Calendula arvensis*, and the Blue Periwinkle, *Vinca major*, were abundant in the railway enclosure. The turbid flood waters of the Plenty River had materially subsided in the interval, following an inspection of a fortnight ago, though the Platypus seen then was not on view to-day. The river crossing was made possible by the male members of the party doing a little bush bridge-building. They also formed a "hand-rail" that proved helpful, and soon all of the party were across the fast-flowing stream.

A change from pasture country, where the Daisy, *Bellis perennis*, was scattered abundantly in damp situations, soon followed, and the party viewed the meandering river from its higher slopes, where, here and in the hinter country, natural history objects were soon in evidence.

Mr. A. L. Scott could be seen pointing out rock folds on the opposite side of the river. Miss J. Rall early had a group of entomologists around her as she barked the Eucalypts in her searches. Messrs. Proudfoot and Hanks commanded the attention of the members to listen to the songs of various birds they named, and to note a robbed nest in a bush of *Acacia armata*. Later they eagerly summoned all of the party to observe a pair of Podargus Owls huddled against the bole of a dry "gum," with necks outstretched and showing evident distaste at Field Naturalists' inquisitive attentions.

The botanists noted, collected and named 127 species of plants, of which 56 were in flower. Ten species of orchids, flowering, were seen with four others out of season. There were seven species of *Acacia*, three of *Mistleines*, while *Raparus variabilis* seemed to maintain a precarious life among the rocks near the river. Of much interest, and quite at home on the slopes, was the prickly-leaved and straggly *Lissanthe strigosa* (peach-heath), so named from the rosy hue of the corolla tubes. Mr. Paton kindly proceeded further afield, with those who wished to extend their observations.

The delightful scent of damp moss attracted us to *Thuidium furfursum*, *Funaria cuspidatus* and *Campylopusis introflexus*, which were collected, and gave scope to the leader explaining the nature of primitive plant life and its origin, while the plant life at the river crossing provided an opportunity to him to explain changes in the nomenclature from former well-known names. Two Rockterns were found (*Cheilanthes tenuifolia*), wide, robust, with tufted roots and flexible stems, and *C. Sieberi*, narrow, creeping, with wiry stipes crowded in rows.

INSECT COLLECTING IN THE GISBORNE DISTRICT.

By G. LYELL, F.E.S.

Most of you know that I have confined my natural history activities to the Lepidoptera, and in the course of the years have gathered together some thousands of Australian species. Though often sorely tempted, I have resisted the urge to collect other orders, finding it difficult enough to provide cabinet accommodation for the butterflies and moths. Unless adequate room can be given, the growth of such a collection is sadly hampered; we should have more young collectors, and more large collections, were it not for the continual expense of new storeboxes in which to house the insects.

Most of my collecting has been done on spare afternoons within walking distance of Gisborne. As the years pass and settlement extends the likely spots within reach are becoming fewer and fewer. The morning up till midday is, I know, the better time to find most species on the wing, but, unfortunately, business has prior claims and holidays have been fewer than with you in the city. Solitary rambles have been the rule, for I know of no one interested in the hobby living nearer than Melbourne; if an acquaintance joins me once or twice during the seasons it is only for the sake of the walk. Fortunately for me, business has taken me to Sydney for a week or so for many past Easters, and the Easter week-end has usually meant a collecting excursion. These trips have often given me more specimens and more new species than I have been able to gather during the rest of the season in Gisborne.

In August and September I did some beating of Eucalyptus and Acacia boughs over an upturned umbrella for Boarmid caterpillars. So far I have had only small success, for the available afternoons have often been wet or windy, but I have seven or eight species now feeding (October) from which I hope to secure moths next autumn. Last season I managed to breed a short series of a moth, *Fisera dictyoides*, which previously was only known by three specimens; of these three I had bred two over 20 years ago, and it is only lately that I have come across the larvae again. The caterpillars of the showy silvery-white *Thalaina punctilinea* are now feeding on the leaves of *Acacia melanoxylon*, and those of the smaller *Thalaina inscripta* on *Acacia dealbata*. Like those of *Fisera dictyoides*, they will enter the ground within a few weeks and will not emerge as moths till April at the earliest.

Pupae of the pretty pink *Winnia lambostella* are found in the bough-tips of the peppermint gums late in September and early in October. In some years the birds discover them and tear the leaf-enclosed silken cocoon and devour its occupant. Another showy moth found at the same time, and in the same situation, is *Euchaetis rhizobola*; the larva joins together three living gum leaves

for almost their full length and pupates in a filmy silken covering between them.

Soon the tree trunks will yield a small harvest of the tiny *Galechiads*, the larvae of which often tunnel in the bark; most of them appear early in the spring. Of 189 species of this family in my collection, 60 are taken in this district. Other moths are found on the tree trunks, too, and the best time for such collecting is after heavy winds, especially when accompanied by rain. Two years ago I caught, on a tree trunk, a pretty little black moth with golden bands across the forewings; this was an undescribed species of *Borkhausenia*. I had caught fleeting glimpses of it from time to time for many years past, but it had always previously eluded me. Its golden bands make it most conspicuous when resting on the bark in the sunshine, but it flies quickly, and once on the wing, seems to become invisible, the black wings and underside defying the eye to follow them; now that I know exactly what to look for I have hopes of securing a series.

Some few of the pretty little *Oecophoridae* are on the wing in October, and most of them fly in the spring. I have 788 species of this large family, but only 247 of them have so far been taken locally. About Christmas time we get two very rare and pretty *Geometrae* resting upon the bark of *Eucalyptus obliqua* (Stringybark). There are 10 species (so far known) of this genus, and all but these two rest on the ground. But *Epidesmia replicataria* and *E. recessata* prefer to hide on the tree trunks, and, with their conspicuously white hind wings hidden, they are anything but easy to find. One disturbs them by beating the trunks, and they at once fly to the other side and nearly always rise too high for the net; when discovered resting a very slow and steady approach with a glass top pill box offers the best chance of capture. These two species are rarely seen in collections; my own long series have taken a good many years to gather; last season six or seven special trips for them were fruitless, only five examples being seen and not a one captured.

On dark evenings—especially when thunder threatens—there are moths to be seen flying around the bright street lamps, and some of them come indoors and may be taken on walls or table. In this way some dozens of species have been added. I have not yet given collecting in the bush with a petrol lamp the attention it deserves. My small experience of such work has been in the mountains of New South Wales, where it was most promising, despite the bright moonlight of the Easter week-end. I live in hopes of doing more of it, but here is where the need of a brother collector is felt. Moonlight nights are the poorest, and on the dark nights the charms of the distant pathless wooded gullies and bush-clad hills are not so alluring when one is alone!

THE BRISBANE RANGES.

The outing to Staughton Vale on October 19 was a treat for those who participated; perfect weather conditions prevailed, and much of interest was observed—and collected.

Owing to the fact that but six names were handed in to the leader prior to the day, the advertised arrangements were cancelled and a motor car was requisitioned for the journey. Our party, which had increased to nine on Saturday morning, left the Footscray railway station at 8.30 a.m., and soon after was joined by Mr. and Mrs. V. Miller in their car. They willingly accommodated two of our party.

On the plateau orchids predominated the flora, over 20 species being in bloom. The most abundant were the Large Waxlip Orchid, *Glossodia major*, R. Br., very fine; the Rabbit-ears Sun-o, *Thelymitra antenniferæ*, Hk.; the Mushy Caladenia, *Caladenia testacea* R. Br., and the Pink Fingers, *Cal. Cornua*, R. Br.

But the outstanding finds were the numerous very fine bushes of the Violet Daisy-bush, *Olearia ludoctrina*, F.V.M., the discovery of which a few years ago (by the Rev. A. C. F. Gates) caused some excitement. On a high eminence to the east we found them; both large and small bushes, full of bloom. The Velvet Daisy-bush, *Olearia pannosa*, Hk., was also at its best, the flowers resembling somewhat the Shasta-daisy of our gardens. The other noteworthy find was the Hooded Caladenia, *Caladenia cucullata*, Fitzg. It was very plentiful on the lower levels, a small but stately plant! Strangely enough, previous specimens collected here have always been determined as *Cal. angustata*, Lindl., but it is beyond all doubt the Caladenia that Fitzgerald described and illustrated so faithfully. Mrs. V. Miller, who observed the birds, writes:

"Thirty-six species of birds were actually observed, several others being heard. Amongst those listed were the Golden and Rufous Whistlers, several Honeyeaters, including the yellow-winged or New Holland, which were very numerous; the Scarlet and Eastern Rosellas; three Robins, including the Hooded species; the Black-and-White and Grey Fantails; White-fronted Heron; and numbers of White-fronted Chats, Blue Wrens, and Thornbills. The delightfully harmonious call of the Grey Shrike Thrush was predominant all day. Some members of the party saw a Bronze-wing Pigeon, which was especially interesting in view of the grave doubt expressed in some quarters as to the wisdom of the recent open season. A number of Banded Plovers feeding close to the road was noticed on the homeward journey. Nests were not numerous, probably owing to the late winter."

Before sunset we had left this interesting locality noting with keen satisfaction the well-kept and beautiful garden of flowers in the adjacent school, and the thriving crops of cereals on all sides. Two large snakes were seen on the hills, one 4 ft. 6 in. in length was killed.

W. H. NICHOLLS.

CENTIPEDES INVADE HOUSE.

A remarkable "visitation" of centipedes is described in a letter to "Sunraysia Daily," from which the following is quoted:-

"A very exciting evening was spent at the home of Mr. and Mrs. T. Smith, Balcatherine, River Darling, N.S.W., on October 4, when Mr. Tom Smith and his brother, Roy, were kept very busy killing centipedes. We were seated on the front verandah, on the floor of which a lantern had been placed. One of the ladies noticed a centipede crawling towards the light, and we knew, of course, that it was the light that had brought it there. Being rather afraid of these creatures, we thought it a wise plan to put the lantern on the ground a short distance from the house. Soon there were seen, coming from different directions, many centipedes, all going towards the light. For about an hour we sat there, and during that time 54 centipedes were killed. A very cold wind began to blow; then a terrific dust storm arose which forced us to enter the house. That was the end of the centipede invasion."

ELLA H. SMITH.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, November 11, 1929. The president, Mr. P. R. H. St. John, occupied the chair, and there were about 110 members and visitors present.

CORRESPONDENCE.

From Mrs. J. A. Leach and family, acknowledging letter of sympathy from the Club in connection with the death of Dr. J. A. Leach.

From the Royal Horticultural Society of Victoria, extending an invitation to Club members to attend their excursion to Mt. Macedon on November 16, also to their Spring Flower Show, at the Melbourne Town Hall on November 14.

REPORTS.

Reports of excursions were given as follow:—Oakleigh Golf Links, Mr. P. R. H. St. John, Labertouche, Mr. A. E. Rodda.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As ordinary members: Miss Sykes, Edithvale; Miss A. R. Rentoul, East Melbourne; Miss V. M. Fawcett, "Ronalds," Melbourne; Mrs. M. A. Legge, Hawthorn; Miss A. E. Cannon, Elsternwick; Messrs. Mitchell and Casey, Melbourne; Mr. A. L. Sullivan, Ivanhoe; Mr. C. L. Griffiths, Oakleigh. As country members: Miss M. I. Hunt, B.A., Hamilton; Mr. C. F. Swinburne, J.P., Gisborne. As associate member: Miss Jean Rentoul, Moonee Ponds.

GENERAL.

Mr. F. G. A. Barnard drew attention to the fact that on this date (November 11) eleven years ago, the Club held its ordinary monthly meeting, and on that day the news of the Armistice in the Great War had just been received.

Mr. A. D. Hardy referred to the destruction of Blue-tongued Lizards by being run over by motor cars on country roads, and said that this appeared, in some cases, to have been done deliberately.

The president, Mr. P. R. H. St. John, said that he desired to thank those members who had assisted in making the recent Wildflower Show a success.

LECTURE.

Mr. A. S. Kenyon, M.I.E. (Aust.) gave a very interesting lecture entitled "The Maori." He referred to the origin of the Maoris and their traditional occupation of the New Zealand Islands. The lecture was illustrated by numerous exhibits of

implements, weapons and handicraft, and also by an excellent series of lantern slides of Maori life.

EXHIBITS.

Miss F. Faul.—Dried pressed specimen of *Thelymitra variegata*, from the Granitians.

Mr. A. D. Hardy.—Young live specimen of Blue-tongued Lizard.

Mr. H. G. Clarke, per Mr. A. E. Rodda.—Small bust of Maori woman, carved in kauri gum. Auckland, New Zealand.

By Mr. F. Pitcher.—Thirty-seven species of Lycopods and Ferns of the Southland district of Otago, New Zealand.

By Miss A. Fuller, per Miss Neighbour.—Seed pod of Dutchman's Pipe, *Aristolochia sipho*, grown in Strathfield, Sydney.

By Mr. Geo. Coghill.—Australian plants in cultivation. Geraldton Wax-flower, Snowy Mint-bush, Rosemary Grevillea, Coast Tea-tree, Purple Kunzea.

By Mr. F. G. A. Barnard.—*Acacia Baileyana*, with gall probably caused by the Acacia Gnat-Gall fly, *Cecidomyia acaciae-longifoliae*, found at Surrey Hills.

By Mr. A. E. Opperman.—Robust stem (18 inches, with ten flowers) of *Calochilus Robertsonii*, Brown-beards from South Warrandyte.

By Mr. P. R. H. St. John.—Specimens in bloom of *Greyia Sutherlandii*, Hooker and Harvey; from the Botanic Gardens.

By Mr. Tarlton Rayment.—Drawings of the morphology of two new bees, illustrating the large golden banded bees *Trichocolletes nigroclyptus* Raym., the queen of digging bees, the heads and genitalia of *T. venustus* and *T. nigroclyptus* and the legless bee *Pachyprosopis fulvescens* Raym.

By Mr. C. Daley, F.L.S.—(a) A good example of fasciation in the terminal shoots of *Calytrix tetragona* Labill, Common Fringe Myrtle. (b) Flowering sprays of Musk Daisy-bush and Hazel Pomaderris, grown at Caulfield.

By Mr. V. H. Miller.—Flowering plants of *Sarcophilus falcatus*, R.Br., from Tambourine Mountain, Queensland.

By Mr. H. P. McColl.—Australian plants in cultivation, *Eucalyptus torquata*, *E. robusta*, *Callistemon citrinus*, *Prostanthera nivea*, and *Telopea oreades*.

By Miss C. Currie.—A large collection of wild flowers, including *Boronia Muelleri*, illustrating her report on the excursion to Labertouche, as well as number of cultivated Australian flowers grown at Lardner.

By Mr. C. J. Gabriel.—Marine shells from New Zealand: *Zenatia acinaces*, Q and G; *Panopæa zelandica*, Q and G; *Chlamys zelandica*, Gray; *Chlamys convexus*, Q and G; *Myodora striata*, Quoy; *Haliotis iris*, Martyn; *Murex zelandicus*, Q and G; *Astræa heliotropum*, Martyn; *Astræa sulcata*, Martyn.

THE PLUMED BEES.

By TARLTON RAYMENT.

Fred Smith, working on the hymenoptera in the British Museum, described many Australian bees which that institution had received from collectors in the antipodes. Among the remarkable insects from the new country were a few black bees, having bright golden bands on the abdominal segments. That was in 1879, when Smith included them in his genus *Paracolletes*, and gave them the specific name of *marginalis*.

Previously, in 1862, Smith had published, in *Transactions of the Entomological Society, London*, the description of somewhat similar females, under the title of *Lamprocolletes venustus*. These, too, were black, banded with gold; but he did not mention a very unusual character of the eyes. The large compound structures have a number of long, sensory hairs projecting from between the convex facets, a feature which is found in only one other genus, *Apis mellifera*, the honey-bee of the hives. The elements of these hairs are, however, found in *Pachyrhinosus haematostoma*, small, glossy, purple-black bees, whose large eyes, when viewed through the microscope, exhibit a number of short, stout, peg-like hairs among the corneules.

Smith's genus, *Lamprocolletes*, has now been merged in his more comprehensive one, *Paracolletes*, but I regret the supersedure, as the characters for this genus, and also those for his *Leioproctus*, are sufficient justification for the retention of his generic names. However, that is a matter to be referred to elsewhere. Professor Cockerell, my mentor in the mazes of taxonomy, in the *Annals and Magazine of Natural History*, 1913, reviewed these black and gold females, and, noting the hairy eyes, created the genus *Trichocolletes*. He had already written to Meade-Waldo, at the Museum in London, requesting him to study the compound orbits of Smith's *Lamprocolletes venustus*, and that entomologist had assured him that they, too, had the distinctive hairs, so the bees became *Trichocolletes venustus*. That was the last overseas record of these large and beautiful Australian natives.

Soon after the Great War had ended, I decided to pay some attention to these plumed honey-gatherers, which were collected at Brisbane and Birkdale, in Queensland, seven hundred or more miles from my home on Port Phillip. I have long refused to be daunted by distance, and the record from the far north did not deter me from endeavouring to find the bees close at hand. I waited until the spring month of October, and set out, for the hundredth time, to find some plumed bees. Fabre, you will remember, told naturalists to keep looking in the right place and

they would surely find, a dictum to which I whole-heartedly subscribe.

Where, one might ask, is the best locality? Well, I had searched, year after year, the blossoms of the Coast Tea-tree, the Beard-heath, the "Boobialla," the Coast-hop, the *Masembry-anthemum*, and dozens of other plants comprising the "Sandring-ham Flora," and there were no plumed bees on all that sea of bloom. Of course, I was not looking in the right place. In the dense growth I had passed over a few odd plants some three feet or more in height, and bearing numerous small, yellow-and-red pea-shaped flowers. The leaves are attenuated, sharp and hard, and these are responsible for the common name "Gorse-leaf Bitter-pea" *Daviesia ulicina* of the botanist.

Certainly I should not have neglected such richly nectariferous bloom, for had I not much experience with this genus, having harvested from it many tons of exquisite, pale, delicately-flavoured honey, perhaps the most attractive in the world. Never shall I forget the apiarist who had in his store-house 12 tons of honey, all sealed in thousands of snow-white combs, each holding one pound avoirdupois. The fragrance of that harvest permeated the atmosphere. I say I should not have passed over the *Daviesia*, though where that magnificent harvest was gathered there were "miles of bloom," whereas, on Port Phillip, I have to search many acres to find one plant.

Convinced that I was looking along the wrong avenue, I at last turned my attention to the rare Bitter-pea. After days of watching I observed a honey-gatherer hover for a minute or two over the blooms, and then disappear with remarkably rapid flight. It looked very like the familiar honey-bee, but its high treble note made me curious and eager to capture one. This I did with difficulty, after swooping through the air with my net many, many times in vain.

However, I have the bee in my bottle, and am able to study her with my lens. Even with that low power I am able to discern her hairy eyes, and the long, plumed pale hairs of her body. She conforms very nicely to Smith's description in everything except size; she is larger, measuring some 13 millimetres in length. She has bright red legs, the dense, yellow, hairy covering of the face, and the black abdomen with its golden bands. Smith's dried and contracted mummy could not be measured accurately, and his estimate of length might easily be astray. I am stressing her size because I have to use it as a specific distinction.

Of course, I was happy to add these fine bees to the fauna of Victoria, and, after all, such pleasures, small though they be, are very genuine, since they are based on a satisfactory reward

for one's labours. But human nature is a complex problem, for I no sooner establish one fact than I am again obsessed with a desire to uncover another. What of the males? Neither Smith nor Cockerell say anything about them.

Two years went by before I tasted again the sweets of accomplishment. It was October. I knew now that the right place was the blossoms of the Bitter-pea, so I sat down and waited. It was a glorious pastime, albeit a little trying on one's patience. However, at Black Rock, for that is where I found the bees, I inhaled the salt air of the sea and felt happy. Presently, when the air was quieter, I heard above my head a shrill note far too high pitched for any honey-bee, and quite different in intensity from the treble note of the blue-banded bees of the Anthophoridae.

Peering into the atmosphere I observed darting specks of light and recalled the Belgian poet's words, "shoots like an arrow to the zenith of the blue." Just so, the males passed like arrows, and my net was almost of no avail. Of all bees, this species has the swiftest flight, and is most difficult to capture, even though one be experienced with the net of the collector. But I did catch a specimen, and since no one else has done so, I append to this essay a description of the allotype. For the moment I am satisfied to point out that the male of *T. venustus* is smaller than the female, for it measures only 11.5 mm. in length. The face, I say, is covered with dense yellow hair. The range of habitat is extended from Birkdale, in Queensland, to Black Rock, on Port Phillip. Permit me to leave it at that for the time being.

I prefer to go once or twice a year into the mountains, where the broken contours provide a relief from the long, level horizon of the sea. Moreover, the tall Eucalypts are in strong contrast to the low tea-tree of the coastline, and the lighter air is enjoyable for a change. I appreciate the mineral waters of the springs about Daylesford, and the flora of that high country affords me an opportunity for further work. On the stony northern slopes, where the native granite is broken into small particles by alternate frost and heat, there is a gritty soil that feeds a number of small shrubby plants and a forest of many-branched trees. Behold, among the former are the Bitter-peas, not the few, scattered gorse-leaf kind, but large areas of a narrow-leaf species, *Daviesia corymbosa*, which has flowers of similar size and colour.

I walked through acres and acres of *Daviesia*, listening for the shrill note of the yellow-banded bees. Well, I did hear it, but I could not get near enough to catch a bee. I secured from the blossoms three industrious females, which, intent on the harvesting of the delicate nectar and the rich orange-coloured pollen, did not escape me. I was spurred to greater effort, but the weather

turned cold, my patience ran out, the bees disappeared. I left the hills with regret, vowing that next October I would remain until I did secure the objects of my quest.

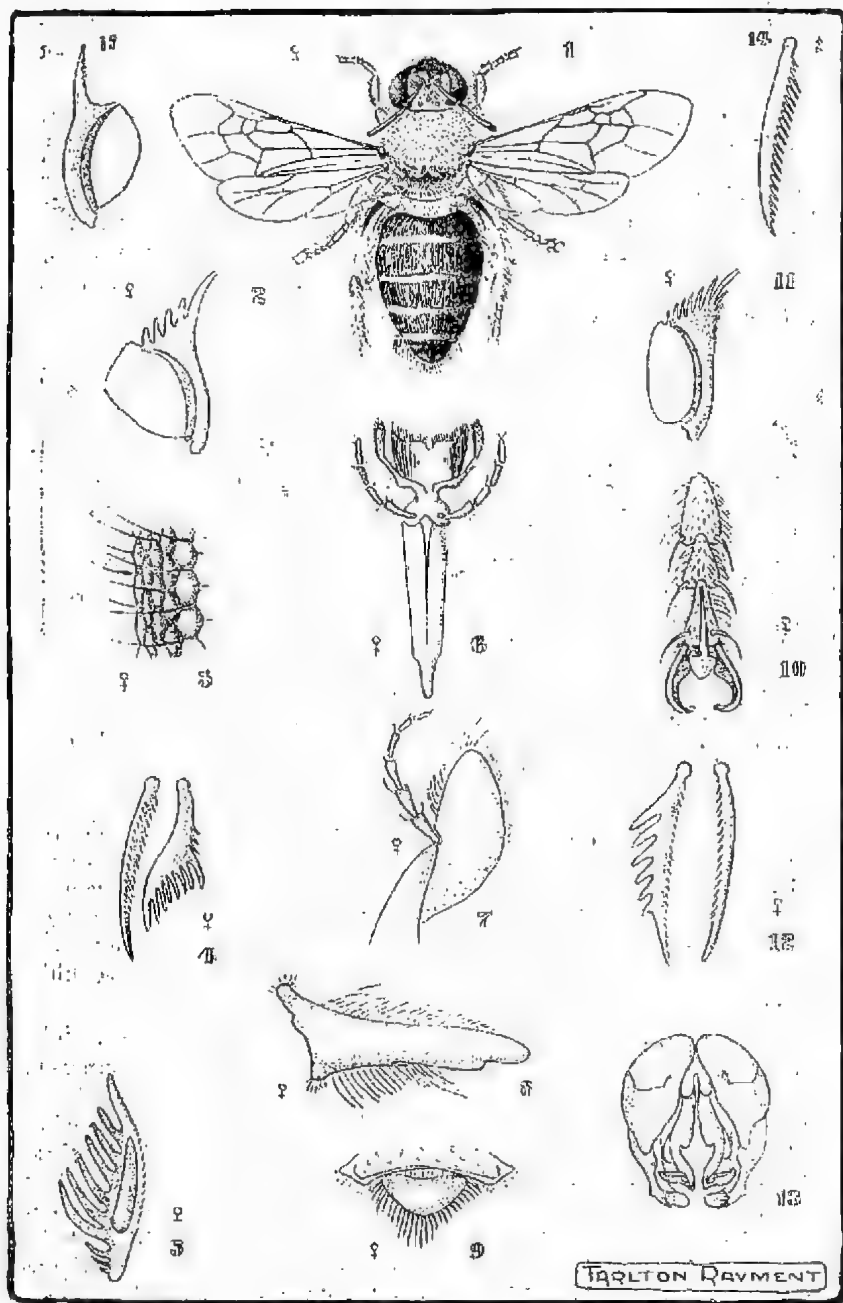
Alas! In the following year influenza robbed me of my strength, and pneumonia and toxæmia followed. When October opened I lay in the hospital with death lurking on the threshold. My doctor brought me back to the land of bees and sunlight, but a whole year went by before I was again strong enough to climb a mountain and drink the icy water of the springs.

In October, 1929, the entomologists of Melbourne planned an expedition to the hills of Macedon. I alone found three miserable bushes of *Daviesia* after some miles of walking. I had no net, so sure was I that the Bitter-pea was absent. Well, right under my nose I perceived a dazling bee with a high-pitched note. I called imperatively for Clarence Borch, and he came running rapidly. "Strike!" And in his net there was the long-sought-for male. Not another was found. I had now both sexes to compare with my other specimens, and decided they were a new species, the chief distinction being the absence of golden hair from the faces, and the sexes being equal in stature, since both measure 12.3 millimetres in length.

The *Paracolletes marginatus*, which Smith described in his work, *New Species of Hymenoptera in the British Museum*, has no hair emanating from the eyes, and Dr. Cockerell thought these bees an example of mutation. According to the theory of De Vries, this phenomenon may arise suddenly: One of the daughters of a hairy-eyed *Trichocolletes* mother hatches out minus the adornments, and her inability to grow the eye-hairs is transmitted to some of her daughters. The structural change was not spread over aeons of time, but occurred suddenly, and the work of Mendel shows that the loss is a permanent one.

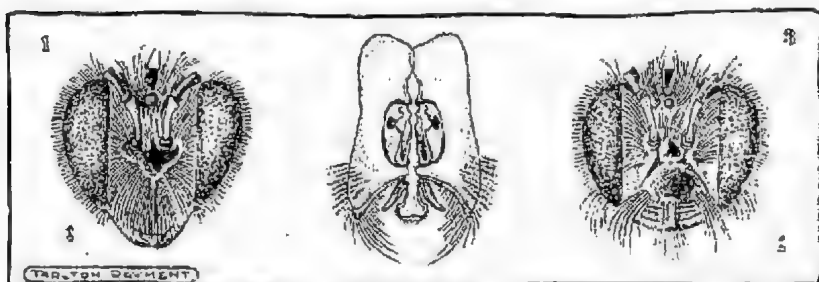
It may have been the other way about; the progeny of a naked-eyed *Paracolletes* may have contained an individual with hairs between the facets, and this accession has been transmitted to all its progeny. Could we have had the brood under critical observation, the number of naked-eyed and hairy-eyed specimens might have been in Mendelian proportions. It seems to me the short, peg-like hairs of *Pachyprasapis* may some day be absent from a specimen; or, on the contrary, I may yet find one of this genus exhibiting the long sensory type.

When Cockerell made his observation *P. marginatus* had been recorded only from the southern portion of Australia, namely, Cheltenham, Victoria, and Bridport, Tasmania, while his hairy-eyed specimens were described from Queensland. My records prove that both bees are to be found on the shores of Port Phillip; but,



whereas the *Trichocolletes* is a-wing only during the last of September and the whole of October, and is confined to visiting the Bitter-pea, the *Paracolletes* emerges later, during the heat of summer, and harvests from utterly different plants:

Both species are splendidly equipped for digging, and excavate shafts several feet in depth; both lay down from a broad tongue a liquid that hardens into a delicate silvery cell-lining of skin, and place in the cradle a sphere of pollen and honey just firm enough to maintain its shape. The sole brood contains males and females, and the larvae rest in the earth for ten months. A rapid development takes place during the last fortnight, and the males precede the females by two or three days.



1. Front of head-capsule of *Trichocolletes venustus* SMITH.
2. Genitalia of *T. venustus*; the plumosa hairs are a remarkable feature.
3. Front of head-capsule of *T. nigroclypeatus* RAYMENT. Note the hair is tufts on the clypeus.

The nests of *T. venustus* that I have observed continued down until a firm subsoil was reached, and the tumuli at the entrance were so solid that they maintained their volcano-like forms for the whole of the month. The *Paracolletes* mound is more friable, easily blown down, and is levelled within an hour or so. The males of some *Paracolletes* make a shrill, thin note when ranging over the flowers, but the note of *Trichocolletes* is much more intense.

Smith described another genus of golden-banded bees, the *Anthoglossa sericea*, and they, too, have a strong resemblance to the honey-gatherers I have already surveyed, but are closer in facial appearance to my *Trichocolletes nigroclypeatus*, for both have whitish hair at the margins of the face. The life-history of *Anthoglossa* is unknown to me, but the large strong comb of the tibial spurs is unsurpassed for digging, and the bees of both these genera must be the greatest of all insect tunnellers. I have followed the shafts of *T. venustus* down for over five feet, and can testify to the efficiency of the pick. The only *Anthoglossae* I have were

collected on the Grampian hills, and in the National Park, Queensland.

The homes of the banded-bees are never so close together as are the shafts of *Paracolletes*, which often have only six inches or so separating them, whereas those of *Trichocolletes* are many yards apart. An interesting feature is the changes in the colour of the hair of the various broods. In 1928 all the males from the only colony I know had deep, orange-coloured face-hair, but in 1929 all the males from the same colony had white hair at the orbital margins. I know that temperature has a great influence on the pigment of developing bees, and I have reared a brood of young queen bees, the progeny of a tan-coloured mother, *Apis ligustica*, that varied from golden-yellow to black; under normal circumstances and an equable temperature, the colour of her children was dark tan.

The spring of 1928 was abnormally dry and hot, August being noted for the prevalence of northerly winds; the vernal months of 1929 were decidedly cool, with frequent light showers. The colour of the honey-bee becomes darker with low registers, but the males of *T. venustus* were paler when the spring was a cold one. I would also remind you that the hills of Daylesford and Macedon enjoy a cool climate with much rain, and the *Trichocolletes* of the regions are distinctly paler in the face hairs.

KEY TO ILLUSTRATIONS (Page 159).

- (1) Adult female *Trichocolletes nigrolypeatus* RAYMENT.
- (2) Antenna-cleaner or strigil: Note the produced velum.
- (3) Portion of compound eye showing sensory hairs.
- (4) The remarkable tibial spurs.
- (5) A view of inside the teeth of the spur.
- (6) Glossa or tongue with long paraglossae and palpi.
- (7) Maxillary palpus.
- (8) Mandible or jaw.
- (9) Labrum or lip.
- (10) Tarsal joints and claws.
- (11) Antenna-cleaner of *Paracolletes plumosus* SMITH.
- (12) Tibial spurs of *P. tuberculatus* COCKERELL.
- (13) Genitalia of *P. facialis*.
- (14) Hind tibial spur of male *T. venustus* SMITH.
- (15) Antenna-cleaner of male *T. venustus*.

In a letter to Mr. C. French, Jun., Mr. H. W. Ault, of Lakes Entrance, writes:—"On November 2 I discovered an Emperor Moth in my cage, which had emerged from a cocoon placed there at some time between April and July, 1924. The cocoons were pulled from a pepper-tree, and given to me by Mrs. Perkins."

TRICHOCOLLETES NIGROCLYPEATUS. Sp. nov.

Female.—Length 12.3 m.m., approx.

Head black, bright, wider than thorax; face marks nil, a tuft of whitish hair at each side; Frons with a minute shagreen, and with large evenly distributed punctures; Clypeus prominently convex, polished, with sparse coarse puncturing, the posterior edge with a few scattered long light hairs, the anterior with golden hair, shagreen well defined; Vertex developed to a sharp edge, with a fringe of long golden hair; compound eyes claret-brown, margins parallel, with long straw-coloured hairs between the facets; Genae with long white plumose hair; Labrum amber-red, subtriangular; Mandibulae dark red with black tips, with a strong inner tooth; Antennae black, apical ends of flagella obscurely fulvous.

Prothorax not visible from above, tubercles obscured by a tuft of golden hair. Mesothorax black, bright, with a minute shagreen and with even, but not dense puncturing, a few golden plumose hairs surrounding the disc. Scutellum slightly bigibbous, similar in colour, sculpture and hair. Postscutellum similar to scutellum. Metathorax very short, but similar to mesothorax in colour and sculpture.

Abdomen with dorsal segments black, dull, hind margin of first obscurely lighter, the others golden yellow fringed with pale hair, the segments having an excessively fine transverse striation; ventral surface similar to dorsal, but with numerous coarse punctures. Legs reddish-amber, coxae and a large patch on femora black, with long pale plumose hair; Tarsi redder, the hair reddish-golden; claws dark red; hind Calcaria red, exceedingly wide, with seven large, strong teeth and three small ones; the Strigil has five strong, long teeth, and the Velum is produced almost to a pyramid; Tegulae yellowish-amber, dark basally and anteriorly.

Wings sub-hyaline, iridescent, anterior 7.5 m.m.; Nervures sepia, first recurrent entering the second cubital cell at apical third of its length, the second recurrent entering the third cubital cell near apical end, basally slightly curved and falling short of Nervulus; cells radial, long and narrow, second and third cubital greatly contracted at top; Pterostigma inconspicuous, sepia colour; Hamuli thirteen in number, of moderate development.

Locality, Daylesford, Victoria, 12/10/27.

Allies: Close to *T. venustus*, Smith, which is larger, has brighter bands, and more hair of an ochreous tint; *Paracolletes marginatus*, Smith, which has no hair on the eyes; *Anthoglossa aureoflincta*, Cockerell, which has black legs and which is larger.

Biological data: I find these females frequent only the plant *Davissia corymbosa* from which they harvest pollen of a dull orange colour; and nectar of a deliciously delicate flavour. No mating takes place in the flowers.

THE WILDFLOWER SHOW, 1929.

This attractive display of native flora, held on Wednesday, October 2, at the St. Kilda Town Hall, was opened by Mr. Chandler, M.L.A., who was briefly introduced by the president of the club, Mr. P. R. H. St. John. In congratulating the club on the fine show, Mr. Chandler referred to the commercial possibilities in connection with the cultivation of wild flowers.

Notwithstanding the lateness of the season and the influence of dry conditions in the Northern areas, there was a fine display of flowers, especially from Gippsland, the vicinity of Melbourne, the Grampians, and the North-eastern district. From the North, Maldon, Taradale, Red Cliffs and Dingee were represented, but there were no flowers from the South-west.

From Queensland Mr. Slaughter, of Thulimbah, sent some attractive flowers; from South Australia, Mr. Ising, of the South Australian Field Naturalists' Club, forwarded a collection. Mr. J. C. Meyers sent Kangaroo Paws from Narrogin, Western Australia, a State which was very well represented by perhaps the finest collection ever staged at the shows, one made up and transported free of charge by the representatives of the Shell Oil Company of Australia. The flowers, some of which were brought from the far north to Perth by aeroplane, were carried to Melbourne in cool storage by boat. They arrived in excellent condition and were very much admired. Mr. Bryant also sent flowers from the same State. New South Wales flora was unrepresented, chiefly owing to restrictions on gathering wild flowers in that State.

Mrs. J. Grylls, of Dingee, forwarded the Blue peas, *Smaisona procumbens*; Mr. L. G. Chandler, flowers of the Cassia, *C. Sturtii* and *C. eremophila*. The Mallee district, on account of drought conditions this year, was poor in flowers. Among Gippsland plants forwarded by Mr. T. Hart, M.A., was *Marsdenia rostrata*. Mr. J. A. Hill, Stawell, sent the large red-flowering *Baeckea ramosissima*. The Misses Currie, of Lardner, had a fine show of flowers. Mr. E. Cooper, senr., Seiglitiz, sent *Olearia pamosa*, not previously exhibited at our shows, and Miss Erica Barton, Sperm-whale Head, sent *Thryptomene Miqueliana*. Miss J. Galbraith, Tyers, had a striking display of 120 species, among which *Correa rubra* was in glorious bloom. The Grammoians flora was well represented by characteristic flowers collected by Mrs. Miller and Messrs. Miller, Williamson and Daley.

The classification table, with 250 species of native plants, staged and named by Mr. H. B. Williamson, was of great educative value. Miss Coleman was in charge of the Orchids stall, where, as usual, an interesting and dainty display of the

quaint and beautiful Victorian species was tastefully arranged. Lady members of the club with friends attended to the various stalls with their abundant wealth of flowers.

In the room set apart for exhibits in natural history were hung Miss A. Fuller's fine collection of water colour studies of Australian and South African wildflowers. These again proved a great attraction. Mr. H. Dickins showed paintings of artistically grouped Australian flowers. Some of these are the originals of the coloured plates embodied in the attractive booklet recently published by the Shell Company of Australia. Miss G. Neighbour exhibited dainty studies of Australian orchids and butterflies. Mr. W. Abraham showed some beautifully arranged, mounted and pressed specimens of West Australian flowers.

Among the other exhibits was a large case of beautiful and rare minerals from the Geological Survey Museum, kindly loaned by the Director, Mr. W. Baragwanath, and arranged by Mr. W. Abraham. Mr. A. C. Nilson staged a varied and interesting selection of natural history specimens, mostly collected in the Mallee district. The Rev. George Cox, in conjunction with the Mornington Naturalist Club, exhibited an extensive selection of marine specimens. The thanks of the Club are due to Mr. Cox for the fine exhibit, and also for explaining the specimens to interested spectators.

Mr. A. E. Rodda showed some marsupial skulls and photographic studies (enlargements) of Victorian reptiles.

The microscopical section of the exhibition was in the hands of Miss J. W. Raff. Attractive afternoon and evening displays were given to large and interested audiences. Microscopes were provided and assistance given by the following members and friends: Misses R. Abbott, I. Barrell, E. Chisholm and A. Kitson, of the Teachers' College, Carlton; Misses E. Andrew, M. A. Ball, A. Flecker, D. Kidd and R. Webb, Messrs. J. Eaton, W. H. Ferguson, C. A. Lambert, W. Ramm, E. A. Saxton, A. L. Scott, J. Searle, J. Stickland, A. J. Swaby, J. Wilcox, M. J. Woodhouse and B. Young, and Masters Donald Barrett and Pat Flecker.

Among the exhibits were specimens illustrating characteristics of Riverworts, mosses, ferns and flowering plants, carnivorous and aquatic plants, fossil plants, living pond life organisms and others. Stereoscopes, showing views of some of our native Orchids, were also exhibited.

The tearooms were well patronised. The information bureau, conducted by Mr. Chas. Daley, proved a great convenience, and sales of nature study publications, etc., were made. This year,

Mr. Hyam undertook the sale of pot plants of native flora in great variety, the results being very successful. The sale of native flowers by lady helpers was also well conducted. The attendance of admiring and interested members of the public and the receipts were alike satisfactory.

Among other contributors of flowers were Mr. A. I. Pitcher, Bright; Mr. Dorman, Taradale; Mrs. Stafford, Lima East; Miss Dyall, Garfield; Mr. J. B. Hodgson and the Misses Rossiter, Hedley; Mr. Fred Barton, junr., Foster; Miss Birch, Tabberabbera; Mr. J. Audas, Frankston; Miss G. Nokes, Mr. Lon McKenny and Miss Thelma Fry, Montmorency; Mrs. T. Brooks, Maldon. Plants under cultivation were shown by the Burnley Horticultural Gardens and Mr. G. Coghill, the Misses Currie, Mr. T. A. Robinson, of Duiton, and others.

There was a large number of willing workers in every section, many of whom gave up considerable time to preparation, arrangement and dismantling of the display—no light task. Mr. V. Miller in this connection did valuable work. The best thanks of the Club are due to these workers, a few only of whom have been mentioned, who so willingly and unselfishly co-operated to maintain that high standard which is associated with the Wildflower Shows of the Club.

Interest in native flora seems to be widespread among our young people, who attended the show in numbers. There is also an encouraging demand for the many attractive native plants which nurserymen are now cultivating with much success.

KINGFISHERS IN PUBLIC GARDENS.

For several seasons past a pair of Sacred Kingfishers has nested in a cavity high up in the trunk of a willow tree in the Treasury Gardens. This year they came again, but the tree has been removed. They stayed around the spot for a few days, and on November 20, I located a nest, again in a willow tree, in the Fitzroy Gardens. From the quavering notes which greeted an arrival of the old birds, the new home evidently was fully occupied. There are at least 3 pairs of these birds now in the gardens.

A.E.R.

FERNS AND PALM TREES.

Walking through the North-eastern portion of the Fitzroy Gardens I noticed how the Common Bracken has taken root in the rough trunks of the Phoenix Palms. A particularly bright green fern caught my eye, and I was surprised to find that it was a well-grown specimen of the Batwing Fern (*Histiopteris incisa*). One usually associates this fern with mountain gullies, but doubtless the constant use of sprinklers in the dry months has made conditions favourable for its development here.

A.E.R.

AT MT. BYRON.

By CHAS DALEY, B.A., F.L.S.

Two years ago considerable interest was evinced in the discovery of a new *Pultenaea* at the Black Range, situated west of the Victoria Range and about 35 miles south-west from Horsham. A visit was made at that time by some members of the Club to the habitat of the plant. (See "*Victorian Naturalist*," April, 1928.)

At the kind invitation of Mr. Harold Smith, of Horsham, who was the first to bring the new *Pultenaea* into notice, Mr. J. W. Audas and I journeyed to Horsham on September 27, in order to revisit the Black Range in the favourable period of the mid-spring season. Next morning, under the guidance of Mr. H. Smith and his brother, Mr. Wilfred Smith, we motored to the Black Range, Mt. Byron, the highest summit, being our objective. We passed the Wimmera River, and later the Mackenzie and the Norton Rivers, both of which were originally discovered and named by Major Mitchell on his famous expedition through Australia Felix in the year 1836.

In regard to the Mackenzie, the result of constructing the Wartook Reservoir in the Grampians, with a capacity of 1,070,000 cubic feet, and of distributing its waters in open channels to the thirsty Northern plains, has been practically to decapitate the Mackenzie River, considerably reduce its contribution to the Wimmera, of which originally it was the chief tributary, and to change materially the nature of the country and the character of the vegetation along its much diminished course.

Travelling southward past Brim Paen Station, we get a fine view of the Grampians, with the prominent peaks of The Asses' Ears; Rose's Gap, named after an early pioneer squatter of the 40's, and the valley through which the tortuous Glenelg flows north-west before breaking through to change its course to the south-west. The line of the Grampians from Mt. Zero, with the outstanding peaks and the sharp and imposing summits of the Serra and Victoria Ranges, makes an impressive sight. Leaving the Hamilton Road, we made our way through several paddocks over lightly timbered country of a broken sandy nature, and at last camped at a water hole opposite Mt. Byron. Here the timber was somewhat better than that seen in the last ten miles, which was of stunted and twisted growth, valueless for use.

A little before reaching the dam we saw our first group of Emus, three in number, which soon were out of sight in the scrub. These fine birds are fairly common around the Grampians. On the previous Saturday our party, which went to Hall's Gap, had seen two Emus cross the road near Pomonal. After lunch we made the ascent of Mt. Byron, and on our ramble found *Pultenaea*

patellifolia in splendid bloom, and the shrubs so numerous that it is certainly a matter of surprise that the plant had remained so long undiscovered or unnoticed. In association with it also in fine bloom was *P. juniperina*, a showy species.

The beautiful little Blue Tinsel Lily, *Calcectasia cyanea*, and the clustered heads of the Mountain Conosperm. *Conospermum Mitchellii*, were numerous. As we climbed Mt. Byron some of the distinctive Crampians plants presented themselves, *Thryptomena*, *Calytrix* and *Micromyrtus*, all in fine bloom, while the Mountain Grevillea, *G. alpina* and the round-leaved Mint-bush, *Prostanthera rotundifolia*, were in unusual richness of attractive bloom. Among the rocks the Nodding Blue Lily made a pleasing show, and the dainty Small-leaf Wax Flower also grew well on the ridge. We mounted the point on which the surveyor's trigonometrical cairn is placed, locally but erroneously attributed to Major Mitchell, who passed west of the range, and named the mount, but did not ascend the range.

The Black Range, although neither so high or so precipitous as the Crampians, preserves in a less degree the same character—the massive sandstones, frequent faulting and cross stratification, bold cliff faces on the one side, with the dip at low angle of the indurated plate-like surfaces on to the other. In the peculiar rock carvings of atmospheric graving tools, there are to be seen on a minor scale the same combinations of symmetry and grotesqueness. At some places cliff faces can almost be ascended by weakened stratified layers like rounded steps. The formation is arenaceous in character, being of a hard siliceous texture, and containing quartz pebbles.

The range is a western vestigial outlier of a once widely-spread and lofty formation, of which the greater part has been removed by long-continued and excessive denudation, leaving the Black Range detached from the main system. Away to the west of it lies the upraised Murray estuary of Tertiary times. A fine panoramic view is obtainable from the summit, comprising the bold outlines of the lordly Crampians and the Victoria Range lined against the eastern sky, always a constant source of delight to the beholder; the expanse of plain to the horizon, northward, broken by craggy Arapiles; and westward the plain and lake country, with the Dundas range to the south-west. One misses on this range the frequent runnels and clear streamlets of the Crampians, for the Black Range is rather dry.

We came down the steep gorge where *Humea elegans* is the chief plant noticeable, but not now in dress array, and we camped for the night.

At dawn a chorus of birds arose around the water hole. One could hear the Magpies, then the Kookaburra and the Butcher

Bird, after which would come the harsh calls of Wattle birds, and the sweeter notes of the Harmonious Shrike-Thrush, Robins, Diamond Birds, etc. The earlier birds, after their song to greet the morn, seemed to be occupied in securing their breakfast. This morning we ascended the range to the right of the gorge, finding the flowers very plentiful but similar to those of the other side. On proceeding further north along the range the country was more open, less broken, with sparse undergrowth which was evidently eaten down by sheep. The prospect from a botanical point of view not being so promising northwards, we returned to camp along the base of the cliffs, in which two caves, when examined, showed no signs of previous occupation by aborigines.

In a dead tree on the slope a colony of bees had hived, and could be seen busily leaving and entering the hollow shaft near the base of the trunk. For prudential reasons a closer inspection was undesirable. The timbered ranges are good country for bee-keeping, and in the season are frequented by bee-keepers, who have to a great extent driven out or eradicated the once numerous native bees, and have installed their own bees, which gather honey from the flowering gums, the chief species of which in the district are Black Box, Yellow Box, Long-leaf Box, Red Stringybark, Messmate, Common Peppermint, Yellow, Swamp and River-red Gum. Other myrtaceous shrubs were the Woolly and the Silky Tea-tree, the Crimson Kunzea, and three *Melaleucas*, the Slender, the Mealy Honey-Myrtle, and the Scented Paper-bark.

As is characteristic of the Grampians country, from the foothills sand predominates in the soil of the surrounding country, and ant-beds are numerous, some of large extent. Although we did not see an *Echidna* or Porcupine Ant-eater, the traces of their presence were very numerous, most of the Ant beds showing evidences of their activity in excavation after their food.

Traces of Kangaroos were frequent, but although said to be numerous we did not see any on this occasion. Whilst at lunch we caught sight of seven emus in the vicinity, making in all twenty-one seen on the visit in four groups. Wombats do not seem to favour this country, and we saw no rabbits.

In the afternoon, an excursion was made towards the southern end of the range, returning along the ridge. Flowers were very abundant. Besides those mentioned, the most striking were the Showy Parrot-pea, the Giant Hoo-bush, the Bundled Guinea-flower in vigorous bloom, the *Astrotricha* or Star-hair, the Oval-leaved *Pseudanthus*, the Large-leaf Ray Flower, the Hair Correa, two *Tetrathecas*, the Horn Cone Bush with very erect habit; the Holly and the Prickly *Grevillea*. Fourteen species of Orchids were noted, but were scantily represented in numbers. The *Leguminosae* were well represented by ten *Acacias*, including the

Twin-leaf, the Spiny, the Leper, and the Plough-share Acacias, whilst the most familiar kinds of Bush-peas and allied species were numerous. Among the Epacrids as was to be expected there was much variety including the Golden Heath, the Flame, the Common, the Woolly, the Pink Swamp-heath, and several Beard-heaths.

Among the Composites 17 species were noted, including the Snow Daisy-bush. The more common spring flowers of the sward were in bloom, among which was *Drosera binata*. The Callitris, or Cypress Pine grew on the range, and other plants showing the northern association were the Buloke Casuarina, the Leafless Currant-bush, five species of Hakea, and a few Silver Banksias. Altogether 208 species of plants were listed for this interesting district, and as it is usually the plants in flower that attract attention, a visit either earlier or later would certainly supplement the list materially.

EXCURSION TO LABERTOUCHE.

Seven members travelled to Labertouche on Cup Day, November 5. In the heart of the bush, at the foot of a low range of granite hills, we parked Miss Currie's car, which had met the party at the Longwarry station. The spot was a glade surrounded by giant eucalypts, with a lusty creek brawling, almost unseen, beneath a dense growth of Fishbone ferns and tall Scented Paper-barks.

All the way, after turning off the Prince's Highway, for about 8 miles, we passed through a wonderful profusion of wild-flowers. Dillwynias burned in flame-like patches amid the tall bracken and under-growth; the pink blossoms of the Wirry Bauera and Pink-eye showed here and there; Nodding Blue-lilies, tall Trigger-plants, Choulate Lilies, and Tall Sundews contended for the sunlight, and on the ground floor were the orchids. Some 10 species of these were noted, five of them, on one occasion, being found within the space of a square yard.

The glory of this roadside was undoubtedly the Blue Dampiera, growing in profusion and rivalling the azure of the sky. Among the taller growths, the creamy drooping blossoms of the Tall Rice-flower, delicately tinted with pink, were very plentiful, in parts, as were also the pure white sprays of the Manukas and Daisy-bushes. The main object of our visit, however, was to see the *Boronia Muelleri*, and we were not disappointed. On the rising ground and the hillsides it was found in profusion. In places it was impossible to tread without crushing scores of seedlings. Those plants that had reached the blooming stage bore beautiful sprays of starry white flowers, often tinged with shell pink, but older ones, that had survived several seasons, bore their blossoms in foamy masses of a more decided pink, almost obscuring the bright green, pinnate foliage. One in full bloom, must have exceeded 8 feet in height.

The country passed over varied from dark swampy soil to gravelly loam derived from the granitic hills, and the vegetation was characteristic of the soils. In the former we found the Screw and Coral Ferns and Maidenhair, also the Sphagnum and Pigmy Club Mosses. The Swamp Paper-barks, in full bloom, grew in dense patches. On the higher and gravelly ground occurred the Silver and Hill Banksias, the Shrubby Casuarina, and Cassinias. The hillside, being very rocky, did not carry much timber. The slender plants of the Star-Hair (*Astrotricha*) were plentiful; and everywhere showed the pink and light green fronds of the Gristle Fern. Down by the gully creek we noted the King Fern and Elderberry Panax. Few birds were seen, but during the day Mr. Proudfoot listed about 26 species.

FISHES AND THE FISHING INDUSTRY.

By P. F. MORRIS.

The study and story of the migration of fishes forms one of the most fascinating romances of the sea. Much has been done in other countries in keeping in check of the movements of fishes, for it is on the knowledge gained of their migration that a successful fishing industry is developed.

As an angler, I have been interested in the migration of Schnapper and Whiting to and from Port Phillip Bay. From October to March the former is very plentiful, and supplies some excellent sport, and when fished for with light gear, it makes the battle with man a fight that gives the fish an even chance, and can be won by the fisherman only through the exercise of his last reserve of skill. I have observed that Schnapper, in the past, have entered Port Phillip heads as "school" fish, and almost invariably followed the deep channel towards Mornington, and worked along the reefs and feeding grounds on the east side of the bay to Albert Park, then across to Altona, Point Cook and into Corio Bay. The migration in 1928 was the reverse of the general practice. The main shoal of fish travelled along the West and Cole's Channels and into Corio Bay, where vast numbers were caught by line and net early in November, and supplied excellent sport till March.

Schnapper, in my opinion, remain "school" fish till they are about 6 lbs. or 7 lbs. in weight. A large number of fish between 6-20 lbs. remain in the bay throughout the winter, but the small fishes migrate along the coast to Queensland and New Zealand in the warm streams and currents of water. The reason why some of the large fish, that is fish over 6 lbs., remain with us during the winter, is one I have been trying to elucidate. My opinion is that they are spawning fish and were themselves born in our waters. The time of breeding of Schnapper is irregular. They are generally found with fully developed roes from November to December. As these large fish have stayed throughout the winter, spawning must have taken place. It is the general opinion that Schnapper breed in the deep waters of the area known as the "Great Shelf," many miles off the coast of north and eastern Australia.

Whiting affords good fishing during the summer months, but is rarely hooked by line during the winter months. Fishermen say that "Whiting go blind" during the cold months. Small catches are made in nets during the winter months, proving that some fish stay in the bay throughout the year. I have been unable to

obtain any correct information regarding this fish. It is evident that it leaves the shallow water for the deeper channels either inside or outside the Heads for breeding purposes.

I have been fishing for 15 years, and during that time I have noticed that fish are on the decrease. Some 10 years ago, one could always rely on a full basket of the fishes in season, but, nowadays, one is very fortunate to obtain an adequate reward for the expense and time spent in the sport of angling. The decline of fish in Port Phillip is due to several causes, and, from my personal observations, I give the following as my reasons for the lack of sport in our bay:—

1. Fish are migratory and return to the places where they were born during a seasonal migratory stage or a stage of seasons. We have not a proper understanding of the migrations and spawning habits of our fishes.

2. Our rivers have become polluted by waste products from tanneries, chemicals, such as soda, from factories, etc.

3. There is a constant dredging of our rivers and bay channels. The ova of fish is constantly being disturbed and mutilated. The silt is carried in dredges a few miles down the bay and deposited. The prevailing winds, from the south and south-west, drive the silt to the eastern and north sides of the bay. The rock formations upon which shell fish and algae grew are now covered with mud many feet deep. These rock formations were the feeding, and, I believe, the breeding grounds of Schnapper and other migratory fishes.

4. This is an Oil Age. Motor boats and other motor craft often accidentally spread films of oil on the surface of the water. There is an escape also from oil-burning steamers and oil-carrying steamers, either wilfully or by accident. Some few years ago millions of Pilchards and Whitebait visited the bay, and great catches were to be made as far as Port Melbourne. These visits are becoming less frequent, due, in my opinion, to the surfaces of oil often met with in the bay. Pilchards and Whitebait are followed by many species of fishes which prey on them. The surface swimming fish is becoming scarce in the Melbourne end of the bay.

5. Long lines and seine netting are killing our largest and smallest fishes. The long lines are made up of great lengths of cord to which are attached shorter pieces of lines with a hook and bait placed at regular intervals. Some long lines are of great length and each end is attached to a buoy.

In support of my statements that one on every hand sees the results of overfishing of many of our species now entering the fish

markets, I give the following figures from the "*Victorian Year Book*," for comparison of the years 1904-5 and 1927-28:—

The return of fish caught in Victorian waters and sold in the fish markets of Melbourne and Ballarat in 1904 shows that 12,728,764 lbs. of fish and 20,560 dozen crayfish were sold. In 1927-28 the fish amounted to 11,742,405 lbs., and 14,024 dozen crayfish were sold. During the period a great decrease is shown in the fish caught in Victorian waters, although the number of men working in the industry has increased from 1089 to 1322, and the number of boats from 654 to 867.

The point I wish to stress is that we should not allow our bays, estuaries and tidal rivers to be polluted or overfished. It is my opinion that the catch of fish outside the Heads is regulated by the protection we give the fish inside. I think that every fifth year the month of November should be declared a "closed period" for Schnapper, caught in nets or by long lines. I am in favour of allowing lines with two hooks during the whole year.

EXCURSION TO SMUGGLERS' GULLY.

Primarily to note the birds of Smugglers' Gully, about 20 members of the Club, on October 26, undertook the walk from South Morang Station across to Diamond Creek. The day was bright and warm, and the atmosphere so clear that the grey of the distant mountains stood out in bold relief to the blue of the sky and the bright greens of the valleys.

A walk of two and a half miles along the road and over fields brought us to the eastern edge of the great basaltic plain where the Plenty River has cut its course deep into the softer Silurian strata. On the way several species of birds were noted, but it was at this point that observations began in earnest, and many new birds were added to our list. All were interested in watching a Thornbill tirelessly feeding an almost full-grown Fantail Cuckoo.

The river was swollen by the previous night's rain, but crossing was made on a sapling bridge. Calling at "The Bend Farm," where the Stutchberry family are all keen bird lovers, we were shown our first nest—a Goldfinch's—cosily tucked away among the leaves and blossoms of an apple tree. To some extent our luck was out, as Smugglers' Gully, usually filled with the song of birds, was strangely silent. No doubt the humidity of the air had made the birds drowsy, or sent them searching for their food on the cooler highland. However, by the time we reached Tanck's Corner our bird list totalled 37 species. From Tanck's Corner, under the guidance of Mr. H. P. Dickins, a three mile walk by road brought the party to Diamond Creek.

Had time permitted, many more birds and nests might have been discovered. This district generally yields something exceptional and unexpected. This time it was a Grey Falcon, *Falco hypoleucus*, usually an island bird. But I was disappointed at again failing to get a definite observation of what I believe is the Painted Honeyeater, *Grantiella picio*. On the following morning, traversing practically the same ground, I noted 19 species additional to the list, making a total of 56.

H. N. BECK.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, December 9, 1929. The president, Mr. P. R. H. St. John, occupied the chair, and there were about 120 members and visitors present.

REPORTS.

Reports of excursions were given as follow:—Macedon Upper, Mr. E. E. Pescott; Croydon, Mr. F. G. A. Barnard; Yarra Junction, Mr. H. McColl; Beaconsfield, Mr. H. B. Williamson; Wandin, Mr. E. S. Hanks; Botanic Gardens, Mr. J. Stickland.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—Miss M. Cunningham, B.Sc., Camberwell; Sister F. Simmonds, Caulfield; and Mr. O. J. Lancaster, Malvern, as ordinary members. As associate member, Master R. D. Croll, Camberwell.

GENERAL.

An invitation was read from the conveners of a meeting to be held on December 10 at the A.B.M. Tea Rooms, McEwen House, Melbourne, to consider the Bleakley Report on the condition of the Aborigines of Central Australia, and inviting representation by the Club. Messrs. A. S. Kenyon, Geo. Coghill and R. H. Croll were nominated as representatives.

The honorary secretary announced that Mr. F. Lewis, Chief Inspector of Fisheries and Game, had presented the Club with a copy of his report on the alleged destruction of marketable fish by the seals on the rookeries off the Victorian coast.

LECTURE.

Mr. R. H. Croll gave an extremely interesting talk on some impressions of his visit to Central Australia. The lecture was illustrated by his own photographs of the scenery of that country and of groups of the Arunta tribe of aborigines, which were clearly and effectively projected by the epidioscope.

EXHIBITS.

By Mr. T. Greaves.—Pitchers of Pitcher Plant, *Cephalotus follicularis*, from West Australia.

By Master Pat. Flecker.—Live specimen of Murray Tortoise.

By Mr. E. E. Pescott, F.L.S.—Flowers of *Elacocarpus cyaneus*, Blueberry Ash, *Hibiscus Huegelii*, *Swainsona galegifolia*, Darling Pea, also prehistoric spear and arrow heads and drills from North America.

By Mr. C. J. Gabriel.—Victorian Fan Shells: *Chlamys bifrons*, Lam.; *C. undulatus*, Shy.; *C. aëtius*, Pett.; *C. perillustris*, Iredale; *C. famigerator*, Iredale; *C. asperimus*, Lam.; *Amussium thetidis*, Hedley; *Cyclopecten fuvus*, Hedley; *Pecten medius*, Lam.

By Mr. P. R. H. St. John.—Herbarium specimens of *Eucalyptus Langii*, Maiden and Blakely, from a tree in a plantation on Dr. P. J. Lang's estate, Lismore, Victoria, August, 1921. Figured in *Crit. Rev. Gen. Euc.* Vol. VIII., pt. 2, 1929.

By Mr. I. L. Hodgson.—(a) Christmas Bells, *Blandfordia flammea*, and Flannel Flower, *Actinotus helianthi*, from New South Wales; (b) flowering specimens of Scarlet Bottle-brush *Callistemon citrinus*, Musk Daisy-bush *Olearia argophylla*, *Hibiscus Huegelii* and *Eucalyptus torquata*, all garden grown.

By Mr. G. Coghill.—Sprays of Burgan, *Kunzea pedunculatis*, grown at Canterbury.

By Miss Dorothy Kidd, B.A.—Plants of *Marchantia* showing antheridial and archegonial heads.

By Mr. H. McColl.—Specimens of *Eucalyptus Lehmannii*, *Anigozanthos flavida* and *Callistemon citrinus*.

By Mr. W. H. Nicholls.—Water colour drawings of Victorian Orchids, including two forms of *Thelymitra media*, R.Br.; a light blue and purple form from Silvan; also an unusually dark blue form from Foster, collected by Mr. F. Barton, junr.; fine specimens of *Thelymitra fusco-lutea*, R.Br., from Hall's Gap (Mr. A. B. Braine), and from Airey's Inlet (Mrs. M. Sutherland).

By Mr. D. J. Paton.—Specimens of the Finger-flower, *Cheiranthra linearis*, from Bendigo, and five Orchids from Boronia: *Pterostylis decurva*, Rogers; *Pl. pusilla*, Rogers; *Gastrodia sesamoides*, R.Br., *Gentiana montana*, Forst., and *Orthoceras strictum*, R.Br.

By Mr. A. E. Opperman.—Common Leek Orchid from South Warrandyte, and flowers of *Leschenaultia biloba* (W.A.), grown at South Warrandyte.

NOTES ON THE VICTORIAN SPECIES OF CASSIA.

By H. B. WILLIAMSON, F.L.S.

The genus *Cassia* is widely distributed throughout the world, being particularly numerous in America, and contains many useful and ornamental species. The leaves of several species from India, Northern Africa and America constitute a medicine known as Senna. The bark and roots of several of the Indian species have been used as an application to ulcers and various skin diseases, as well as internally in diabetes and other disorders. In India skins are tanned by a preparation made from the bark of *Cassia auriculata*. *C. occidentalis*, a native of the East and the West Indies is naturalised on Mauritius, where the roasted seeds are used by the natives as a substitute for coffee, and with good effect in cases of asthma. The long pods of *C. fistula* contain an aperient pulp of pleasant taste and medicinal value. This species, called the Pudding Tree, from the peculiar pods, is a handsome tree with the foliage of the ash and the flowers of the Laburnum. The pods are very unlike those of the other species, being cylindrical, black, woody, one or two feet long, and not splitting but marked by long furrows, and divided by transverse partitions into a number of compartments each containing a single seed embedded in pulp. Several species of this large genus are in cultivation, their foliage being handsome and their flowers bright coloured. The genus belongs to that section of the family Leguminosae known to botanists as *Caesalpinioideae* in which the petals are not very irregular as in the section *Papilionatae* (Peas, Beans, etc.). The petals are yellow, usually with conspicuous veins, somewhat unequal, and the ten stamens often vary in size, a few being sometimes aborted (staminodia). The leaves are pinnate with no terminal leaflet (paripinnate), but sometimes the leaflets are undeveloped, leaving only the flattened leaf-stalk (phyllode). The pod usually splits into two valves; the case of *C. fistula* is an exception, and is divided by more or less distinct transverse partitions. There are about 30 Australian species, all trees or shrubs, more than 20 being endemic and 27 of them occurring in the northern States. Fourteen occur in New South Wales, four in West Australia, and six have been listed in the Victorian Census. These last can be roughly identified by means of the key as under:—

1. Leaflets in 6-10 pairs, glands between leaflets slender, $1\frac{1}{2}$ -2 mm. long *C. australis*
 Leaflets in less than 6 pairs (ex. *C. artemisioides*), glands clavate, depressed or obscure 2
2. Leaflets flat or concave
 Leaflets flat, in 1-3 pairs *C. desolata*
 Leaflets concave, in 3-5 pairs *C. Sturtii*

Leaflets narrow-linear, terete or channelled

Leaflets in 1 or 2 pairs, green, stalks often vertically flattened *C. cremophila*

Leaflets in 3-8 pairs, plant silky white . . . *C. artemisioides*

Leaflets none, reduced to phyllodia, silky white *C. phyllodinea*

CASSIA AUSTRALIS Sims var. *revoluta* Bth.

A tall shrub with paripinnate leaves and rather showy yellow flowers. The leaflets in the normal plant, which does not appear to have been gathered in Victoria, are up to one inch long, oblong-lanceolate, obtuse, only slightly recurved at the margin, while in the variety *revoluta* they are narrow and acute with rolled-back margins. The glands between the leaflets take the form of slender processes 1 to $1\frac{1}{2}$ mm. long, not often between all pairs. The pod is 3-4 inches long and about $\frac{1}{4}$ inch wide, much compressed, straight or curved. It must be regarded as one of our rarest plants. The only Victorian specimens I have been able to inspect are Mueller's original collecting "from Avon River, Gippsland," fresh specimens sent to the Wild Flower Show a year or two ago (T. S. Hart), and a small piece collected at Orbost (E. E. Pescott).

CASSIA DESOLATA F. v. M.

This and the four other species to be discussed are "Desert" plants confined for the most part to the dry central region of Australia. It is a shrub which when young is hoary or white, becoming glabrous with age. Leaflets in one or two, rarely three pairs, ovate, obovate or broadly oblong, $\frac{1}{2}$ -1 inch long or more, coriaceous, with glands between the pairs depressed but rather prominent, rarely wanting. The flowers are rather large. This plant differs from *C. Sturtii* in its large and fewer leaflets, and I suggest that its inclusion in the our Census is due to errors in determination of *Sturtii* specimens, although it may have been owing to the true *desolata* being labelled "Murray" and "Murray and Darling."

CASSIA STURTII R.Br.

A bushy shrub usually hoary with a close tomentum, and with leaflets in 3-5 pairs, linear-lanceolate, cuneate or obovate $\frac{1}{2}$ -1 inch long, thick, concave. Pod about $\frac{1}{2}$ inch broad, very obtuse. Bentham placed the species in his Key, p. 281, in the subsection with "glands sessile, flat, obscure or none," but in my investigation in the northern Mallee in October, 1928, all the specimens which I gathered at Mildura and Murrayville bore club-shaped glands from 1 to $1\frac{1}{2}$ mm. long, and on comparing them with specimens previously gathered at Ultima, Lake Boga, Piangil, and other places in the North-West, I found the same prominent glands. In all these specimens the leaflets were long, lanceolate or oblanceolate.

CASSIA EREMOPHILA, A. Cunn.

A bushy shrub, glabrous or slightly hoary, but never so white as some of its allies. Leaflets are in 1 or 2 pairs, very narrow-linear or terete, and channelled above, about one inch long, the petiole being often longer, and sometimes flattened vertically; glands depressed but somewhat prominent. This is wide spread through the N.W. district, and is the only species found within 30 miles of Melbourne, being an example of the remnant of "Mallee" flora between Melton and Bacchus Marsh, where there is an isolated patch of *Eucalyptus Behriana*, Bull Mallee interspersed with other plants usually occurring only in the Mallee district. The plant, sometimes associated with *C. Sturtii*, forms an attractive feature of the Mallee vegetation. Bushes four to five feet high with their mass of yellow flowers, often interspersed with shrubs of Daisy-bushes white and blue, velvet bush and blue Halganias, the pink Austral Hollyhock and other shrubs blooming in early spring make a gorgeous show in favourable seasons. The name "Boronia bush," used in some places, has little to commend it except perhaps the general shape of the corolla.

C. EREMOPHILA var *platypoda* Bth.

This very distinct form has petioles flattened to almost two lines broad, with leaflets reduced to one short pair, a large percentage of them being aborted till the petiole is really a phyllode. I had specimens with no leaflets taken in Mildura in 1923, which I placed as *C. phyllodinea*, but investigation on my late visit proved them to be the variety *platypoda* of *eremophila*, since on every bush examined either a few leaflets or rudimentary ones were present; also glands were found at the summit of the flattened petioles. I have specimens of this variety gathered at Barton, West Australia, by Mr. G. Coghill a few years ago.

CASSIA PHYLLODINEA, R.Br.

A rigid, bushy shrub hoary or white with a close, silky tomentum. The leaves are all reduced to phyllodes, one to two inches long, and about two lines broad, set vertically on the stem, and having an oblique point. Mueller was disposed to unite in one species this, *eremophila* and five others because of the occurrence of intermediates. Bentham says that this would entail for the same reason the inclusion of several others which are easily distinguished. Those specimens in which leaflets are suppressed can generally be distinguished from *C. phyllodinea* by the glands at the end of the flattened petioles, and since the pods of the latter are broader, and the whole plant silky white, the identification is not a difficult matter. All specimens in the National Herbarium from definitely stated Victorian localities, and labelled *C. phyll-*

odinea, agree with my Mildura specimens, and must be referred to *Cassia cremophila* var. *platypoda*.

CASSIA ARTEMISIOIDES Gaud.

A bushy shrub hoary or white with a minute silky tomentum. Leaflets in 3-8 pairs, terete or channelled above, sometimes glabrous in age, with a prominent gland between the lowest pair. This has been gathered rarely in Victoria. There are specimens from (a) Echuca, Mr. King, 1906, which may have been gathered in the Riverina; (b) from "Wimmera," C. Walter, and (c) "N.W. Victoria," C. Walter, 1886. I failed to come across it in my searches in October, 1928.

Although the last five species when taking into consideration New South Wales and South Australian forms, appear to run into each other, the above notes should enable the authentic Victorian species, *cremophila*, *Sturtii*, and *artemisioides*, to be easily identified.

BOOK NOTICE.

Open-Air Studies in Australia, by Frederick Chapman, A.L.S., F.R.M.S., etc., London: Dent and Sons. 10/6d.

Since the appearance of the late Dr. T. S. Hall's *Victorian Hill and Dale*, some 20 years ago, nothing has been published, regarding Australian geology and physiography, of so interesting a nature as the volume under notice. Like Dr. Hall's explanations of some of nature's puzzles which had previously appeared in the public press, so Mr. Chapman's essays are the bringing together of articles which had appeared during the course of years in the *Melbourne Age* and *Argus*. They have been brought up-to-date, and now have the advantage of illustrations to aid in making clear their several points. Unfortunately, however, some of the illustrations are on too small a scale adequately to portray the physiography of the localities discussed.

The volume answers many questions which are liable to arise at any time during one's reading, and is therefore distinctly useful to have at hand for reference. Some idea of its character may be gathered from the titles of a few of the chapters, for instance, "The Romance of a Building Stone," "The Poetry of a Pebble," "Buried Rivers; Their Alluvial Gold," "Obsidian Buttons—An Australian Riddle." While the author's remarks are based mainly on Australian evidence, he has in many instances called attention to parallel occurrences in other lands. Thus England, Scotland, Europe, and other parts of the world are found to yield similar examples. In this way the volume will be of interest to readers in many countries, and will, in turn, serve to give such readers an insight into some of the physical facts of Australia.

Coming to Australia, as palaontologist to the National Museum, Melbourne, with an enviable reputation as an authority on the lowliest forms of fossil marine life, and as a great worker Mr. Chapman's almost 30 years' acquaintance with Australian forms has enabled him clearly to demonstrate some of the past history of our great island continent in a most interesting manner, and many of his fellow members of the Field Naturalist's Club, whatever may be their hobby, will doubtless be pleased to make room for *Open-Air Studies in Australia* on their bookshelves.

F.G.A.B.

A NEW PRASOPHYLLUM.

By W. H. NICHOLLS.

Prasophyllum Morganii, n.sp.

Planta robustiuscula, 20-25 cm. alta. Folium? (imperfectum); basi vaginatum. Spica conferta, circiter 8 cm. longa. Flores sessiles, virides, variegati, purpureis, lineis vel maculis. Ovaria brevia, turgida. Segmenta-perianthi subaequalia, circiter 4-5 mm. longa. Sepalum-dorsale late ovatum, erectum, concavum, basi contractum. Sepala-lateralia elliptico-falcata, libera, antus-concava, divaricata, patentia; prope-basem inflata. Petala patentia, obtusiusculis, apicibus recurva, circiter $1\frac{1}{2}$ mm. lata. Labellum parvum, reniforme-cordatum, purpureum, $2\frac{1}{2}$ -3 mm. latum, $3\frac{3}{4}$ mm. longum, recurvum; marginibus integris, crenatis, apice-versus pars callosa papillosa, tenuis, triangularis. Columna robusta, brevissima; lacinae laterales oblongo-falcatae, obtuso-obliquae. Rostellum erectum; apice bifido. Anthera parva, orbiculata, caudicula brevi.

A plant of robust habit, 20-25 cm. high. Leaf? (upper part missing), its base sheathing. Inflorescence crowded, very compact, 50-80 flowers in a spike at about 7-8 mm. Flowers sessile, green, variegated, prune or purple markings. Ovary green, rather large, turgid, with a broad appressed bract at the base. Lateral sepals, dorsal sepal and petals, almost equal in length (4.5 mm). Dorsal sepal erect, concave, broadly-ovate, acuminate, $2\frac{1}{2}$ mm. wide, contracted at the base. Lateral sepals free, spreading, glandular, elliptic falcate, curving upwards and inwards over the labellum, inwardly concave, inflated towards the base; apices slightly bidentate. Petals spreading, narrowly-oblong, recurved, slightly broader towards the tips, where they are somewhat blunt. Labellum small, reniform-cordate, on a broad claw; almost as broad as long, purplish; its widest part $2\frac{1}{2}$ -3 mm. wide; contracting abruptly to an acute, often recurved apex; membranous part slightly wider than the callus plate; margins entire or crenulate; callus plate not conspicuous, of a dark prune colour, somewhat papillose, reaching almost to the tip; apex sometimes bifid. Column erect, very short and broad, about $1\frac{1}{4}$ mm. high. Anther small, somewhat orbicular, pale-coloured; lateral appendages about as high as the rostellum; tips rounded, oblique, prune-coloured; basal lobe small, ill-defined, botryoidal. Rostellum bifid. Pollinia 2-bilobed; caudicle short. Tubers ovate-oblong.

For this *Prasophyllum* (of which two specimens only have so far been found), I am indebted to Mr. H. B. Williamson, F.L.S. They were collected at Cobungra, an Alpine station in the far N.E. of Victoria, by Mr. H. Morgan; the original discoverer, also of the beautiful Golden Caladenia (*C. Hildae*, P. and

N., *Victorian Naturalist*, January, 1929). Mr. Morgan writes: "They were growing on the sunny side of a small ridge running down to Spring Creek; the soil is inclined to be clayey, with a little quartz and sandstone among it." Two other species are also referred to, viz., *Pr. brevilabre*, Hk.f., and *Pr. Suttonii*, Rogers and Rees. These also grow in the vicinity.

This plant is well-defined, and hardly likely to be confused with any other recorded form. It is pleasantly fragrant. Victoria, Cobungra, November 26, 1929. (A specimen has been forwarded to the National Herbarium, Melbourne.)

Explanation of Figures—Plate VII.

Prasophyllum Morganii, n.sp.

- (a) Plant three-quarter natural size.
- (b) A flower from front.
- (c) Labellum from front.
- (d) Pollinia
- (e) Column from front.
- (f) Appendage of column.
- (g) A flower from above.

ORCHIDS NEAR GISBORNE.

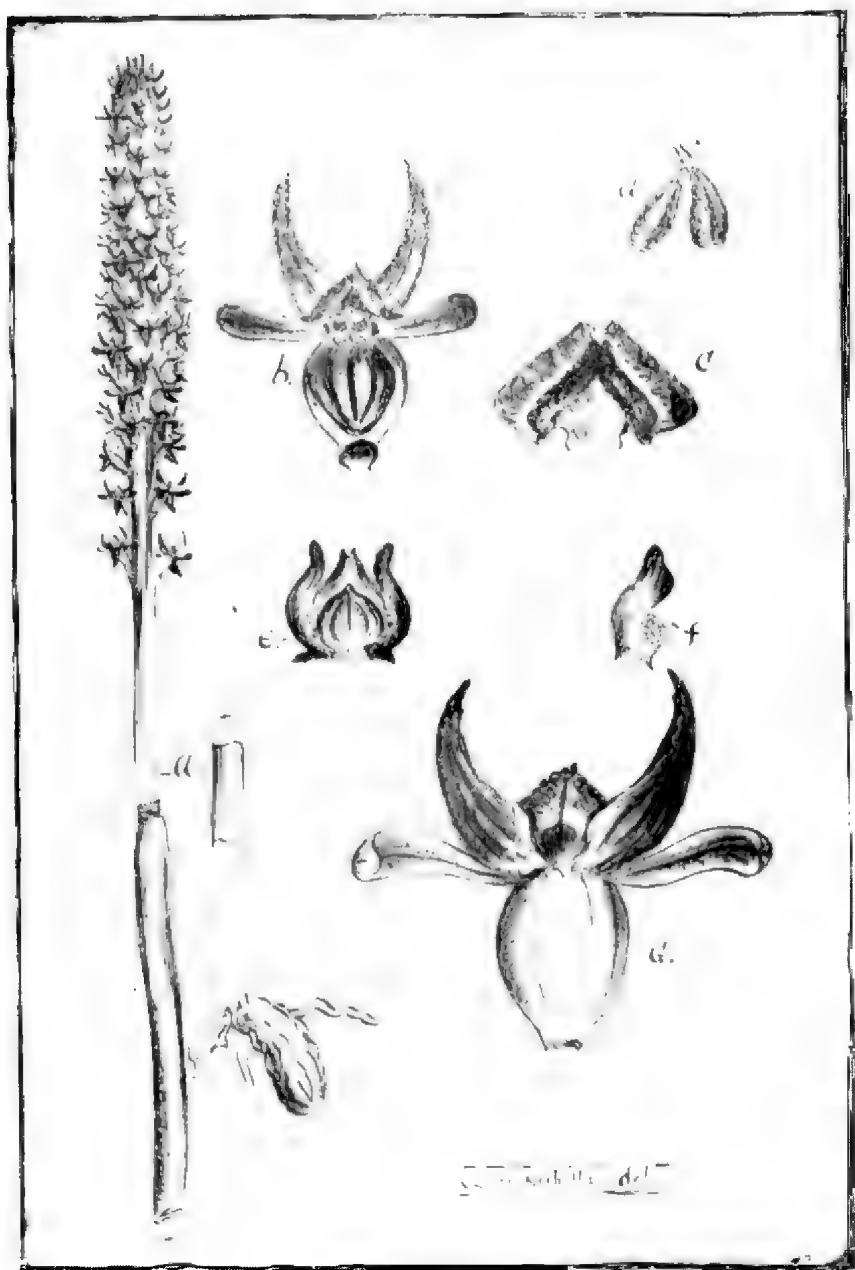
On December 28, Mr. F. J. Bishop and I visited the Pyrcle Ranges, which are distant from the township about five miles in a S.W. direction. We were fortunate to meet Mr. G. Lyell, F.E.S. The weather was ideal for rough walking and the countryside looked its best after the recent rains. Our first finds were *Microtis porrifolia*, Spg., and *M. parviflora*, R.Br.; the next an exceptionally fine specimen of the rare Elfin Leek Orchid *Prasophyllum intricatum*, Stuart. These were rather plentiful on a grassy slope; several had 14 flowers. Very darkly hued and the lateral sepals of remarkable length in some specimens ($7\frac{1}{2}$ mm).

Continuing our ramble we were soon climbing rocky spurs, and descending from one of these we passed over some open spaces. Here I noticed a strange plant at the base of a fern frond. It proved to be a specimen of one of our very rarest Orchids, *Spiculacra Huntiana*, F.v.m. A sustained search of the immediate vicinity revealed many more. We also found specimens of this (new South record) in the depression, and on the following spur. In all, 40 specimens were collected. Photographs were secured. This remarkable plant is known as the Elbow-Orchid. The only other Victorian locality is Cravenville (A. B. Braine) in the far North-East. It has been found in New South Wales (two localities).

During the day we found other interesting plants, including the two Duck Orchids (these also in fair numbers), *Caleana major*, R.Br., and *C. minor*, R.Br. A photograph of five plants of the former species was secured under natural conditions. *Diosodium punctatum*, the Hyacinth Orchid, was in bud stage everywhere. We returned by another route to the township, collecting (in another locality) more very fine specimens of the Elfin Leek Orchid. Truly this district and that of Coimadai, just beyond, bid fair to become famous in the annals of Australian orchidology.

W. H. NICHOLLS.

Plate VII.



Prasophyllum Morganii, n.sp.

TWO VARIABLE ORCHIDS.

By W. H. NICHOLLS, with Notes and Comments by the
REV. H. M. R. RUPP (N.S.W.).

Diuris sulphurea, R.Br. (Fig. 1), is one of our showy terrestrial species, but like most plants, it has its variations; these variations, or differences, of form, colour, etc., are apparent to all observers, and are usually of little importance. Fig. 2 shows an unique specimen. Though obviously belonging to the genus *Diuris*, curious to say, the flowers resemble, somewhat closely, those of another genus, viz., *Dendrobium*, Sw. But even a casual examination proves them to be but a form of *Diuris sulphurea*, the "black eyes" of which species, set off by a sulphur ground, are one of its characteristic features. This beautiful form (of which two specimens only were found) was collected by the writer on the hills beyond Coimadai, near Bacchus Marsh, Victoria, on November 5, 1929. On these hills the normal form was most abundant, growing chiefly within the shelter of colonies of the Daphne Heath (*Brachyloma daphnoides*, Bth.);

The lateral sepals of the form under discussion instead of being prolonged into tails, a feature from which the generic name is derived (*Diuris* = two-tails) are *petaloid*. The transformation is indeed extraordinary! The colouring of the perianth-segments is, as usual in the normal type, a bright sulphur-yellow; the labellum is pale orange; the conspicuous markings are dark purple, and the lateral sepals in individual blooms are tipped with crimson, a delightful combination.

Their pansy-like appearance is so unique for double-tails, and the change of form and colour in the paired sepals, thus brought into conformity with the other segments, together constitute flowers so beautiful that to leave them scientifically unrecognized seemed to me at first like slighting two very beautiful creations of Nature, and my intention was to describe this particular form as var. *petaliformis* n. var. But on November 17 I again visited the locality and failed to find additional well-developed petaloid forms. On the other hand, I found specimens of this orchid showing the gradual evolution of the petaloid type. (See Figs. 3 to 13.)

The character of the above specimens is doubtless of great botanical interest, as it proves somewhat conclusively (in my opinion) that this and *Diuris dendrobioides* (a plant figured by Fitzgerald), are but abnormal or teratological specimens of *D. sulphurea*, R.Br., and *D. punctata*, Sm., respectively.

Strangely enough, Fitzgerald also records the finding of but two specimens, though he refers also to an indefinite record by another collector *1 (Mr. A. G. Hamilton).

(*1 Mr. Hamilton was quite definite to me about it.—H.M.R.R.)

Fitzgerald writes:—

"*Diuris dendrobioides* may not be considered an established species, as I only found two plants at Cunningham's plains, near Murrumburrah, and Mr. A. G. Hamilton has obtained what he considers to be the same plant at Guntawang, near Mudgee. The two plants obtained by me grew close together in a field where numbers of *Diuris elongata* (now *D. punctata*) and *D. pendunculata* were in flower, and they may have originated from a cross between the two species. They had, however, some characters very distinct from both, such as breadth, shortness and colour of the lower sepals. They are, I think, worthy of a figure and a name, whether others are found elsewhere or not. If not, it is very interesting as an example of a very distinct form, of which two examples at least have existed, and which, if it could establish itself and become numerous, would undoubtedly be considered a species." (*Aust. Orch.*, Vol. 1.)

There seems hardly any justification, in my opinion, for considering these forms as hybrids. If such forms originated (taking Fitzgerald's plant as an example) from a cross between a purple and a yellow-flowering species, one would reasonably expect some of the colour characteristics of both parents to manifest themselves in the resulting hybrid.

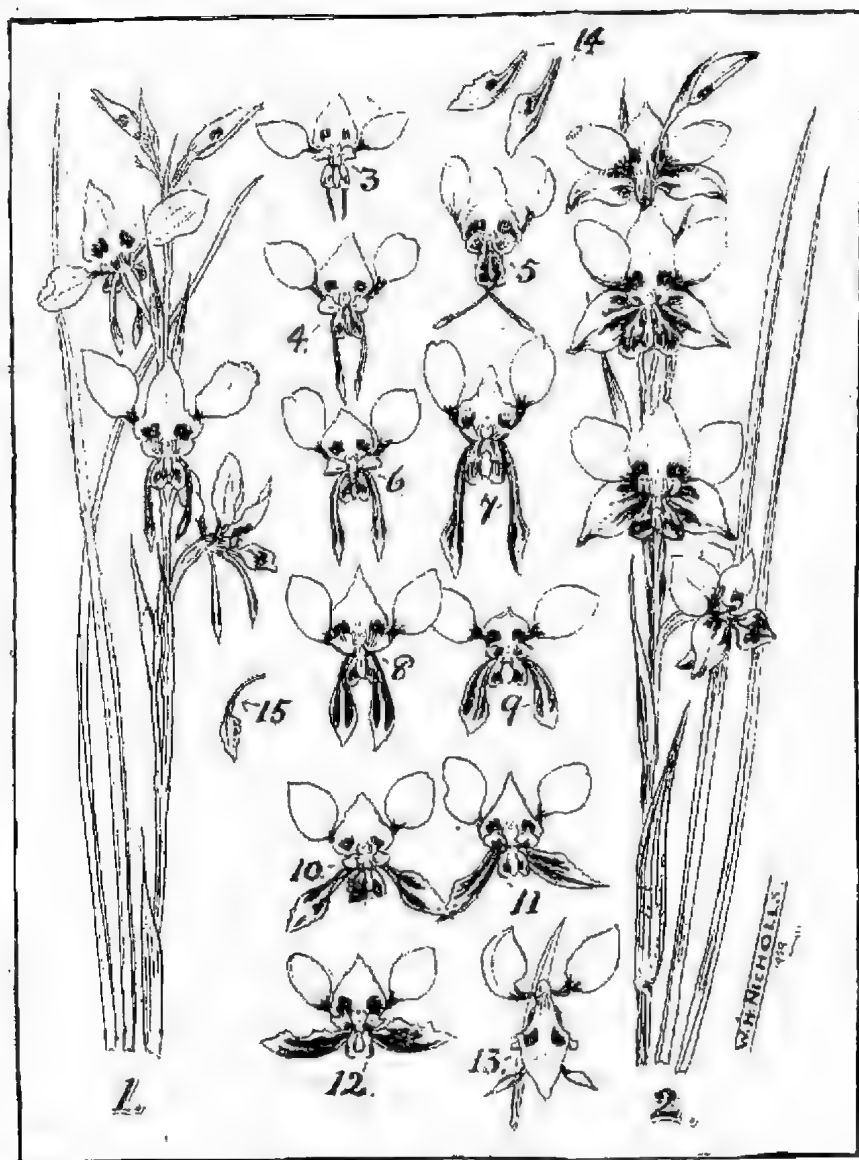
Fitzgerald's plant had flowers coloured only like *D. punctata* *3, and his analytical drawings do not show any very important departure (other than the petaloid sepals) from those of Smith's species. Which, it may be of interest to say, is like so many of our orchids, of very variable character.

I have seen the flowers of *D. punctata* *2, ranging in colour from the very palest mauve to the very deepest purple, and curiously enough, I have collected a specimen having its several flowers wholly a rich cream colour! The undulate character at the sepals, etc., shown in Fitzgerald's drawing, is occasionally observed in the flowers at *D. punctata*, also in some other species belonging to this attractive genus.

The other orchid mentioned by Fitzgerald (*D. pedunculata*, R.Br.) is one of our best known species, very common, and most easily recognised; it is always of somewhat golden hue.

The petaloid forms illustrated, and those mentioned by Fitzgerald, are not the only examples on record. (The form shown in Fig. 2 and Fitzgerald's *D. dendrobioides*, are doubtless of very rare occurrence). Still, there is no justification at present, in my opinion, in giving these forms even a varietal name, let alone one of specific importance. November 18, 1929.

A letter received from Dr. R. S. Rogers, M.A., M.D., F.L.S., of South Australia, on November 19, contains the follow-



D. sulphurea, R.Br., and abnormal forms.
Collected at Coimadai, Victoria, and from Tasmania and
New South Wales.

ing interesting passage in reference to these abnormal specimens:—

"The petaloid sepals are merely an ancestral reversion, an attempt on the part of an irregular flower to become more regular in form. In some instances such reversions occur with such degree of frequency that they are more or less permanent and in this respect may establish their claim to be regarded as a species or variety."

*2 *D. punctata*, Sm., the flowers of this species are not spotted as the name would suggest, and the species name is therefore regarded as a misnomer, but very fine specimens received from the Rev. George Cox, of Mornington, Victoria, some years ago, had, all of them, a conspicuous line of purple glandular dots along each side of the callus plate of the labellum. Possibly such a feature suggested the specific name. In New South Wales these glandular dots are of frequent occurrence.

*3 Colour of *D. dendrobioides*.—The plate in *Aust. Orchids*, Fitzgerald, in the Melbourne Public Library, shows this plant (or rather the flowers) light purple. Mr. Rupp refers to the colour as *dark red-brown*! Individual plates, therefore, must be differently coloured (W.H.N.).

Notes and Comments by H.M.R.R.

(1) After very careful examination of specimens and study of Fitzgerald's plate and remarks, I cannot agree to accept Fitzgerald's *D. dendrobioides* as a teratological form of *D. punctata*, Sm. It may be so, but, in my opinion, Mr. Nicholls' exposition of the petaloid form of *D. sulphurea*, R.Br., is by no means certainly applicable to *D. dendrobioides* as a form of *D. punctata*. I have in my possession a New England plant collected by the Rev. F. N. McKie, which appears to me an analogous case of *D. punctata* developing a petaloid form, but I could not identify this plant with *D. dendrobioides*. In colour and in all respects save the shortened petaloid sepals, the New England plant conforms to *D. punctata*, but I cannot see how this can be said of *D. dendrobioides*. There is no record, so far as I am aware, of *D. punctata* in any of its variations developing a "dark red-brown" *3 colour, and the foliage of *D. dendrobioides* is totally different. The lateral lobes of the labellum in the latter species seem to me relatively much smaller. I have collected *D. punctata* in varying forms in three Victorian and six New South Wales localities, over a period of 30 years, but never in a form which would lead me to interpret *D. dendrobioides* as a mere variety, or teratological form of this species. In the case of the petaloid form from New England, on the contrary, there is instant association in the mind of the observer with *D. punctata*. And this is undoubtedly the case with the petaloids of *D. sulphurea*. These were very numerous a few years ago, near the Launceston golf links, in Tasmania, but

though I observed some there almost as pansy-like as Mr. Nicholls' flower, it never occurred to me that they were other than *D. sulphurea*. While venturing to differ, therefore, from Mr. Nicholls' conclusions about *D. dendrobioides*, inasmuch as I do not consider it quite an analogous case to the petaloid *D. sulphurea*, I am in complete accord with him in regard to the latter, and his paper will be of great value in calling attention to the occurrence of petaloid sepals in the genus *Diuris*.

(2) I have myself called the attention of several botanists to the frequent assumption that the name *punctata* as applied to the *Diuris* so named is a misnomer. The glandular dots on the basal half of the labellum, shown by Fitzgerald himself and referred to by Mr. Nicholls, may very well have been the ground of the nomenclature. They are not, perhaps, sufficiently striking or constant to justify the author, but neither does there seem to be justification (apart from the question of priority), for the use of Brown's nomenclature name *elongata*, since that would apply equally to *D. alba*, and in some degree to one or two others.

KEY TO FIGURES, Page 183.

- Fig. 1. A normal specimen of *D. sulphurea*, R.Br.
Fig. 2. A well-developed petaloid form.
Fig. 3. A flower from a juvenile plant (note undeveloped L. sepals). Very numerous at Coimadai in November.
Figs. 4-5. Flowers showing different positions assumed by the L. sepals (note large "eyes" in Fig. 5).
Figs. 6-7. Two flower types (Fig. 7 shows abnormal L. sepals).
Figs. 8-9. Two flowers with short, abnormal L. sepals.
Figs. 10-11. Two flowers, showing the gradual development of the petaloid type of sepal.
Fig. 12. A flower, somewhat similar in outline to *D. Dendrobioides*, Fitzg.
Fig. 13. A characteristic attitude of mature flowers of *D. sulphurea*, R.Br.
Fig. 14. Individual L. sepals from flowers of *D. sulphurea*, R.Br., collected near Launceston golf links (Tasmania), November, 1921 (H.M.R.R.).
Fig. 15. L. sepal from a flower of *D. punctata*, Sm., collected near Ben Lomond (New South Wales), at 4700 feet (Rev. E. Norman McKie, November, 1929).

The lateral sepals as they develop into the petaloid form, assume also a brighter hue.

PROFILES OF THELYMITRA COLUMNS.

By T. GREEN.

Orchids are said to be the aristocrats of the flower world, and some have developed peculiarities which, at a glance, tell that they are Orchids. The *Thelymitra* is different. It makes no showy display of its class. All species of the genus adopt the same style of dress, and Blue *Thelymitras* in the bush are just Blue *Thelymitras* until you look right into the very heart of the flower. Its dress, the perianth, tells us little regarding its species, and it is in the flower itself—the column—that we must seek for its specific name. To flower lovers enjoying a spring ramble in the bush, Blue *Thelymitras*, without a name, are very charming flowers, and it matters little to them whether one may be *T. aristata* and another *T. longifolia*. These are wise folk for they gather joy at little cost.

Botanists may be real flower lovers, but, at least seemingly, they usually set more value on names than on the loveliness of blooms. Roughly they handle things of beauty, tearing the specimens up, root and all, to be put between paper folds and pressed into a flattened mass, and then they march on, looking for another victim, also to become a flat, dried record of the find. I am more of the flower lover than the botanist. I treat the Orchids I gather very gently. I want to get them home in as fresh and natural a condition as possible, so that with my camera I may secure a much more life-like record.

The plate illustrates profiles of columns of seven of our Blue *Thelymitras*. The columns of *Thelymitra* interest me as much for the minute beauty I find in my magnified photographs as for their guidance in name determination. They are like dainty bits of loveliness from fairyland—marble caves which might be dwelling places for fairy queens. However, the photographs were not taken to illustrate a fairy tale, but as a guidance for name determination. Until lately *T. ixioides* was known, in Victoria, by its spots. The coming of *T. Merranac* makes it, now, imperative for the collector to overhaul the column also. The illustrations of these two species need no explanation; they are sufficient in themselves to show all the difference that can be seen in a profile view. And it is not my intention to follow the botanist and supplement with worded pictures.

You will note the great similarity in the general shape of the columns (as seen in profile) of *T. aristata*, *T. longifolia*, and *T. megalyptra*. They all have the same type of hood, and the main difference to be discerned from a profile view is to be found in the character and position of the hair tufts. The tufts in *T. megalyptra* are very distinctive; they stand out horizontally from the column, like two stiff scrubbing brushes. The illustrations of



Thelymitra aristata.



Thelymitra longifolia.



Thelymitra Merranae.



Thelymitra pauciflora.



Thelymitra ixioides.



Thelymitra media.



Thelymitra megalyptra

T. aristata and *T. longifolia* show how the hair tufts differ in these two species. In *T. longifolia* it is not, exactly, a turning upwards of the tufts, but a growing upwards from the columns somewhat as in *T. ixioides*, while in *T. aristata* they grow outwards and then turn upwards.

T. media needs no comment. It has a very beautiful and distinctive column. I cannot understand why this species was for so long named New South Wales form of *T. ixioides*, as there is such a marked difference between the columns. At a glance in the bush *T. media* might easily be mistaken for *T. grandiflora*, but never for *T. ixioides*.

Referring again to *T. longifolia*, I wish you to note that the hair tufts are mop-like and resemble the tufts of *T. ixioides* more than they do those of *T. aristata*.

(The illustrations on Plate VIII. are from photographs by Mr. Green, who has taken a very extensive series. Many of his Orchid photographs are unique and of considerable scientific value, while numbers of others are charming pictures.—Editor.)

EXCURSION TO YARRA JUNCTION.

A small party travelled by train to Yarra Junction on November 30. The day was cool and fine. Such wild flowers as could be observed from the train gave promise of rich displays at our destination. *Brunonia australis* could be seen in profusion near Wandin, also *Kunzea*, *Leptospermum*, and many others. On arrival at Yarra Junction we were met by Mr. Lyle and his daughter. Miss Lyle joined the party and showed both a great interest and knowledge of the local flora. The country traversed was most varied—flats, hillsides and ridges—and a large number of plants were in flower. Some curious specimens were collected, botanical and otherwise, including a pure white "bluebell." A caterpillar with a number of red parasitical insects aroused much curiosity. The few birds noticed included Blue Wrens, White-eared Honeyeaters and a pair of Bronze-wings.

H. P. McCOLL.

PINK-BREASTED ROBINS AT MILLGROVE.

Early in December last, Donald Barrett, a junior member of our Club, found a nest of the Pink-breasted Robin, *Erythrodryas rodinogaster*, at Millgrove. There are comparatively few records of this species nesting in Victoria, though it is fairly often seen, or heard, in the deep gullies, notably of the Dee and the Don Valleys. The nests are not easily discovered.

The nest at Millgrove was in the fork of a bough arching over the timber track at a height of about 20 feet. The birds were feeding young, and were clearly identified, the male appearing several times, its rose-pink breast beautiful in subdued sunlight.

On two occasions, the late Mr. A. J. Campbell noted, the Pink Robin was associated with expeditions of the Field Naturalists' Club. On the memorable Yarra Falls trip a nest was found in the shades of a beech forest, and the first authenticated eggs of *E. rodinogaster* taken on the mainland were the fruit of the discovery. When a party of Club members was ascending Mount Strzelecki, on Flinders Island, a nest of the Pink Robin was observed in a gully near the summit of the peak. *Nests and Eggs*, p. 139.

CHRISTMAS BUSH.

In most countries where the Christmas festival and its associations are honoured, Christmastide has some plant in favour in connection with its observance, or noted for bursting into bloom during the period.

Thus, holly and mistletoe are typical or symbolical of the glad season in Britain. In several of the Australian States we have flowering plants which have been named as Christmas bushes from the circumstance of their timely flowering.

In Victoria the Christmas Bush is the freely-flowering *Prostanthera lasiantha*, with creamy petals, which fall like delicate snowflakes beneath the bush, a handsome shrub which delights to have its roots in moist places where rippling water flows in shaded, ferny valleys. I have two shrubs growing in the home garden, and blooming freely for the first time in three years' growth. The roots must be kept moist, or the plants wilt in the summer sun. Corranderk is said to be the native name for this mint-bush.

In Eastern Gippsland I have heard the term Christmas Bush also applied to the Sweet Bursaria, *Bursaria spinosa*, which, in clumps of fragrant, white or creamy flowers, is in delightful bloom around Mallacoota and the Eastern rivers at Christmas time.

In New South Wales the Christmas Bush is *Ceratopetalum gummiferum*, an attractive shrub or tree with small white flowers, having jagged petals. These quickly wither and fall, then the calyx enlarges and turns a reddish colour, pleasing in appearance. The branches are much used in Christmas decoration. When broken the shrub exudes a red astringent kino. This plant can be readily cultivated and is highly decorative. In New South Wales there are also Christmas Bells, *Blandfordia nobilis*, a plant with stiff, narrow leaves, and wax-like flowers, usually found in moist sand-stone places. The flower stem in the middle of the tuft bears a cluster of red, bell-shaped pendant flowers varying in colour from reddish-brown to yellow.

Then, in Western Australia we have as Christmas Bush a tree very different in character from others. It is *Nuytsia floribunda*, belonging to the family of the Loranths or Mistletoes. It has a bulky trunk, and has branches from the stem, covered when in bloom with a blaze of brilliant orange flowers in great profusion. This distinctive plant is sometimes also called the blaze tree.

In New Zealand there is a Christmas Bush which grows in the ranges in the vicinity of Auckland, with a profusion of red flowers. Near the coast it is more shrubby in habit, but profuse in attractive flowers, making a fine show.

All of the plants mentioned bloom freely at the festive season, and have beautiful flowers which readily lend themselves to decorative purposes,

C.D.

NOTES ON NEMOPTERIDAE.

No group of insects is more curious or less known than the Nemopteridae. They are few in species and very rare in collections. The discovery, therefore, of a new Australian Nemopterid deserves a note in the *Naturalist*.

At Cheerita Station, North-western Australian, two specimens of a thread-winged lace-wing were collected by Mrs. Herbert Barrett, who has a nature lover's interest in entomology. Mr. J. Clark, entomologist at the National Museum, to which they have been given, states that the insects are certainly new. They will be forwarded to a specialist on the group, at the British Museum.

Chasmoptera hutti is a Western Australian Nemopterid, widely noted as an insect oddity. Its hind pair of wings are not thread-like, but form a spoon-shaped tail of rather elegant appearance. The new species has hind wings as slender as any lace-wing antennae, and glistening as if they were threads of silk dipped in palest silver. They are shorter and more slender than those of *Croce attenuata*, the Nemopterid described by Froggatt, from Queensland. The Crocinae are represented in Western Australia, Tillyard states, by an undescribed genus. Is the Chirrita form a member of this, or still another new genus?

All the Nemopterids are remarkable, but the most curious, perhaps, yet discovered, is the cave-dwelling *Pterocroce storeyi* of Egypt. Further specimens of this rare insect have recently been obtained by the Entomological Department of the British Museum, and form the subject of an article by D. E. Kimmins in *Natural History Magazine* (11, 12, pp. 133-6). This species has a peculiar interest for me, since I spent many hours on broiling days hunting for the long-necked larvae in the type locality, near the pyramids of Giza. The late G. Storey collected larvae in the fine dust covering the floor of a cave, and bred out the delicate lace-wings of the species named in his honour. They fly at dusk late in the summer time, the thread-wings streamers, the fore-wings only being of use for flight.

I saw only one larva of *Pterocroce*. It was about three-eighths of an inch in length, with a neck like a rod, and longer than the flattened body. The food of the cave-dweller probably consists of beetle larvae and other small creatures; the transformation to the pupa takes place within a cocoon, and the complete life-cycle may occupy more than twelve months (Kimmins). We know little or nothing of the earlier stages of our described Nemopterids, and doubtless other species await discovery.

C. BARRETT.

INSECTARIUM AT SCHOOL OF AGRICULTURE.

Professor Wadham (Professor of Agriculture), being of the opinion that, for a thorough training in entomology, students should have facilities for handling living insects for themselves, one portion (about half) of the Insectarium, which has been erected in the University grounds, will be reserved chiefly for their use, as well as for general demonstration purposes.

The students should be able to work at such branches of the subject as the following:—

Life histories and general bionomics of plant-eating caterpillars (noting number of instars, method of feeding, and effect on host plant; number of broods a season; presence of natural enemies, etc.). Same for sucking types, bugs, etc., and for common soil pests.

Rates of Reproduction of *Aphis*, etc., and effects of temperature and moisture on rates of reproduction. Rearing of some of the commoner leaf-mining and gall-forming insect pests.

Natural Parasitism. Collection of caterpillars on a large scale, and rearing for parasites. Same for scale insects and other forms, noting the effect of parasites on the natural control.

Effect of *Aphelinus* on the control of Woolly *Aphis*, and other experiments on similar lines. Experiments with "lady-birds" and other predaceous forms on common insect pests.

The second portion of the Insectarium is composed of six separate "insect-proof" chambers, and these will be used chiefly by research workers on special problems. Three of these chambers have earth floors, the other three having concrete, so that both plot and pot experiments can be carried out.

EXCURSION TO CROYDON.

This excursion, on Saturday, November 16, was attended by about a dozen members and friends. The day was rather close, with a threatened thunderstorm, and we did not cover as much ground as had been planned. Following the railway line towards Mooroolbark, we soon found that many of the spring flowers, owing to the frequent showers, were still blooming well, and numerous liliaceous species, though somewhat common, were noted.

About a mile from Croydon we found a fine patch of the Blue Pin-cushion, *Brunonia australis*, just coming into bloom. This reminded us of Robert Brown, Victoria's first botanist, whose name it commemorates. In a hollow not far away was one of the plants we had come to see, the Sickie Greenhood, *Pterostylis falcata*. Here they were by the dozen, growing almost in water, and very fine specimens indeed. A few plants were removed for home cultivation, but probably its liking for a swampy spot will make this more difficult than with *Pterostylis rufans*, the Nodding Greenhood, which is easily cultivated, while its very sensitive tongue makes it an interesting object to those to whom this peculiarity is unknown. The threatened thunderstorm now prevented further exploration, and we returned the way we had come, gathering bunches of the Manuka, *Leptospermum scoparium*, and the smaller grass-tree, for home decoration.

F. G. A. BARNARD.

LIFE AT SEAL ROCKS.

Rich in facts that interest the naturalist, as well as information chiefly of economic importance, is the report of the Chief Inspector of Fisheries and Game on an investigation into the feeding habits, etc., of seals in Victorian waters. The investigation, on scientific lines, was made in consequence of fishermen's complaints that seals were interfering with their operations, damaging nets, taking toll of "commercial" fishes, and so forth.

The Chief Inspector (Mr. F. Lewis) personally visited Seal Rocks, spending a whole day (December 12, 1928) on them. He was accompanied by Mr. W. J. Kennon, of Cowes, who had been engaged to conduct the investigations at this haunt of the Australian Fur Seal, *Arctophalus doriferus*. The following is quoted from the report:—

"Mr. Kennon had a day or so previously set some crayfish pots between the Nobbies and the Seal Rocks. Five pots in all were lifted on my visit for a catch of two dozen crayfish. Some pots had leather-jackets in them, which had killed and eaten some of the crayfish. Leather-jackets are very destructive to crayfish, as is also the octopus. Some of the pots had been set within 100 yards of the Seal Rocks where there were thousands of seals, yet no interference with the pots was apparent. As a matter of fact, only small seals could get into the pots, and having once got in could not get out again and would be drowned. There were great numbers of seals swimming and diving about all around our boat. We anchored about 100 yards from the rocks on the western side, and three of us fished with lines and in a quarter of an hour got about 50 parrot fish, sometimes two at a time. These are rock fish living in holes amongst the rocks at the bottom. During the whole of this time seals were swimming about close to the boat. Mr. Kennon states that parrot fish have always been plentiful like this in the vicinity of the rocks during the past 25 years. We landed on the rocks at 9 a.m. Great numbers of seals were in the water swimming and diving about. Practically all of the big males remained on shore, the seals swimming about in the water apparently being females and young males. Each old male seal seems to have a definite territory, on which it is an offence for any other male to trespass. Seals are polygamous, and from what I could see each seal has a harem of about eight to ten females. It is very difficult indeed to drive these old males away from their territory. If it is attempted they show fight and adopt a very vicious attitude. Each of these males appears to take charge of an area of approximately twenty yards square, and the whole of the rocks seem to be thus occupied, which would go to show that this rookery is at breeding time as fully occupied as is possible. The present being the breeding time there were great numbers of pups about. A rough estimate showed at least 1000 of these lying about in groups, some sleeping, some scrambling over one another and some in small rock pools where they were apparently trying to swim. Quite a number of these pups must be killed as a result of the fighting of the big bulls, which in their fights with each other sometimes will blunder right on top of a dozen or so pups. The fur of the pup is a dark, silvery grey, very soft and silky to the touch. I should imagine that the skins of the young ones at this time of the year would make up well. The noise made by the big old males is a hoarse 'woof' uttered in a very ferocious manner. The females have a higher pitched bark, and the young 'baa' like lambs. Two were killed, one a half grown and the other a big male. The stomach of the small one contained nothing but a few bunches of red worms, and that of the big male was full of liquid, nothing else. It was interesting to see one adult male seal drinking salt water, lapping it up just like a dog. Great numbers of birds, consisting of silver gulls, crested terns and sooty oyster catchers were breeding on the rocks. During the whole period of our visit there was a ceaseless clamour caused by the fighting males, bellowing

females, and the 'bawing' of the pups, together with the calling and shrieking of the thousands of birds."

The result of the investigation is in favour of the seals. The reports of their depredations have been exaggerated, and Mr. Lewis does not think that at the present time there is justification for any wholesale slaughter. "The matter, however, should be carefully watched," he adds, "and if in the future the seals show signs of becoming too plentiful and invading the bays and harbours in large numbers, and if it be found that the present system cannot cope with the matter, the rookeries should be visited by officers of the Department during the breeding season and the numbers reduced by the killing of a certain proportion of the pups, and, if possible, the surplus young males."

Naturalists will welcome this report, and the views expressed by the Chief Inspector of Fisheries and Game should meet with general approval. They are based upon knowledge, not assumption, and are fair both to the fishermen and the seals.

EXCURSION TO BEACONSFIELD.

Favoured by fine weather, twenty-two members and friends spent a pleasant day at Beaconsfield on Saturday, November 23. The time before lunch was spent along the banks of Cardinia Creek, where bell-birds were inspected at closer quarters, and the vicinity explored for plants in bloom. Among the latter were *Acacia mollissima*, *Melaleuca squarrosa* and *M. ericifolia*. Shrubs of *Pomaderris prunifolia* were seen, but past their bloom. Fringe Lilies *Thysanotus tuberosus*, and Purple Bladderwort, *Utricularia dichotoma*, were also noted, and the interesting function of the root vesicles of the latter discussed. Close to our lunching place at the creek a nest of the Grey Fantail, *Rhipidura albiscapa*, with its peculiar descending stem, was inspected, the sitting bird just assuming a "good-day-to-you" manner, perhaps aware of the efficacy of the barrier formed by the creek between her and her visitors. After lunch we walked a mile or so to the week-end residence of Mr. and Mrs. F. Hewett, from whose balcony a splendid view was obtained over the country to the west. A start was then made—by invitation—for Holm Park, a country residence of Miss Ada Armytage, on the way inspecting a peculiar growth in a gum tree. The curiosity in the growth of this tree, *Eucalyptus elaeophora*, Long-leaf Box, was brought under the notice of the Club by Mr. J. W. Audas, 18 years ago, and a fine photograph appeared in the *Naturalist* of March, 1911. Miss Armytage received the party hospitably, and after refreshments were served, entertained her guests in her beautiful home, where they were either inspecting valuable antiques or the nicely kept grounds, or else looking for novelties in the adjoining wild bush. On the hedge of Hawthorn round the garden, plants of *Loranthus pendulus*, Drooping Mistletoe, were noted, a further proof of the wide range of hosts selected by this parasite. The *Crataegus* itself was found to be spreading in the surrounding bush, many seedlings being noted amongst the wild shrubs. Those of the party who had so reached home early were driven to the train by Mr. Hewett, while the remainder accepted the invitation of Miss Armytage to dinner, after which they were given the opportunity of viewing the sunset from the summit of the tower. Though not gorgeous on this occasion, the night was beautiful in its greys and pinks with narrow, silver linings picking out the darker cloud-banks, and it is no wonder that our hostess, as an enthusiastic lover of Nature, glories in her turreted castle in the hills. The most interesting finds of the day were the orchids *Chiloglottis Gunnii*, Bird Orchid, *Colochilus campestris*, Peaked Beard-orchid, and *Pterostylis decurva*, Summer Greenhead, named a few years ago by Dr. Rogers.

H. B. WILLIAMSON.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, January 13, 1930. The president, Mr. P. R. H. St. John, occupied the chair, and there were about 90 members and visitors present.

CORRESPONDENCE.

From Sir A. E. Kitson, acknowledging congratulations sent to him as a member of the Club, on his election as president of the Geological Section of the British Association for the Advancement of Science meeting held in South Africa.

From the Victorian Forest Commission, regarding Bush-fire Prevention Week, and enclosing posters and wind-shield stickers for distribution to members.

From the Wild Life Preservation Society of Australia, drawing attention to the threatened extinction of the Thylacine or Marsupial Wolf, of Tasmania, and asking the co-operation of the Club in the Society's efforts to have this unique animal placed on the protected list. On a motion being submitted to the meeting that the request of the Society be complied with, it was unanimously carried.

REPORT.

A report on the excursion to Cembrock on December 14 was given by Mr. H. B. Williamson, F.L.S.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—Mrs. C. Barrett, Elsternwick; Miss K. E. Hall, B.Sc., Camberwell; Miss C. Glass, B.A., Camberwell; and Miss Graham, Newport.

GENERAL.

Mr. F. G. A. Barnard drew attention to the announcement of the death of Mrs. Halley, mother of Mrs. G. Coghill, and widow of the late Rev. J. J. Halley, one time president of the Club. A resolution that the sympathy of the Club be expressed to Mrs. Coghill was carried.

A resolution that the congratulations of the Club be conveyed to Mr. F. Chapman, A.L.S., on his being awarded the Lyell Medal by the Geological Society of London, was unanimously carried.

In connection with the jubilee of the Club, which will be celebrated this year, it was resolved that a sub-committee be appointed to work in conjunction with the Club committee. The following were nominated:—Mrs. V. H. Miller, Dr. H. Flecker,

Messrs. F. G. A. Barnard, E. F. Pascott, F. Pitcher, J. A. Kershaw, A. Mattingley, C. French, junr., and W. H. Ingram.

LECTURE.

Mr. C. Barrett, C.M.Z.S., gave an interesting and entertaining talk on the work of the recent British Expedition to the Great Barrier Reef. The lecture was illustrated by lantern slides from photographs of the personnel of the expedition as well as of the flora and fauna of the reef and of the adjacent mainland.

EXHIBITS.

By Mr. P. R. H. St. John.—Herbarium specimens of *Hexaglottis virgata* (Jacq.), Sweet; syn. (*Moraea virgata*, Jacquin). Fam. Iridaceae, introduced from South Africa; found by exhibitor in the Domain near the Observatory, December 23, 1929. First record of the plant in Victoria.

By Mr. L. Hodgson.—Dried specimens of Christmas Bells, *Blandfordia nobilis*, from Port Stephens, New South Wales.

By Mr. T. Greaves.—Insects from West Australia; Jewel Beetle, *Stigmodera cancellata*; and the Ants *Myrmecia vindex*, Sm., *M. mediorubra*, Forel, *M. mandibularis*, Sm., and *Camponotus postcornutus*, Clark.

By Mr. F. G. A. Barnard.—Remarkable fungus found at Croydon in mid-December, preserved in glycerine and water, apparently *Anthurus Muellerianus*, Koch (Cooke's Handbook of Australian Fungi, p. 216, fig. 103, *Gastrocybeae*).

By Mr. A. E. Opperman.—(a) Fruiting branch of *Acacia glaucescens* (?) attacked by a gall-forming insect; (b) Fruiting branch of *Acacia pycnantha*, Golden Wattle, bearing an unusual number of pods.

By Miss A. Flecker.—Wattle Goat-Moth.

By Master P. Flecker.—Crustaceans from Rickett's Point.

By Miss B. Bolton.—Large Tongue-orchid, *Cryptostylis longifolia*, from Mallacoota.

By Mr. E. S. Hanks.—Live specimen of Gecko Lizard.

By Mr. A. E. Rodda.—Plant specimens from the fore-shore at Geelong: *Kochia tomentosa*, Silky Bluebush; *Salsola Kali*, Prickly Saltwort; *Suaeda australis*, Seablite; *Atriplex cinereum*, Coast Saltbush; *Scirpus nodosus*, Knotted Club-rush; and *Galanina secunda*, the last-named an introduced plant from South Africa.

By Mr. A. Mattingley.—Starfish from Great Barrier Reef.

By Mr. H. P. McColl.—*Anigozanthos flavida* and var. *purpurea*; *Tristania conferta*; both grown at Kew.

By Mr. A. J. Tadgell.—(a) White-flowering specimen of Self Heal, *Brunella vulgaris*, found growing at Belgrave in association with the normal purple-flowering form. (b) Specimens of *Lythrum flexuosum*, Lag., Wiry Loosestrife, a perennial herb intro-

duced from Europe, now recorded for the first time for Victoria: closely resembling the native animal, *L. Hyssopifolia*, but differing in its larger flowers, and in six of the 12 stamens being exerted.

By Mr. H. B. Williamson.—Dried specimens of *Cassia* illustrative of the exhibitor's article in the January *Naturalist*. These included specimens of the pods of *C. fistula*, Padding Pipe Tree, and other exotic species lent by the Government Botanist.

By Mr. W. H. Nicholls.—Type specimens of *Prasophyllum Morgani*, Nicholls, and *Thelymitra Merranae*, Nicholls, recently described by the exhibitor. (b) Coloured drawings of *Spiculacea Huntiana* (F. v. M.), Schltr. from specimens recently collected at Gisborne by the exhibitor.

THE SEASON'S EFFECT ON PLANT LIFE.

I do not know if the present unusual seasonal conditions may be responsible for a little upset in the botanical world of Victoria. A changed season affects humans, and doubtless has far reaching results in the plant world. Mr. W. H. Nicholls recently beheld with pleasure, for the first time, one of the rarest of Victorian orchids—the Elbow Orchid—growing at Gisborne, comparatively close to Melbourne. In my own garden a *Lomatia Fraseri*—sister of the native holly—is one mass of cream flowers. It is not a matter of looking for flowers, which seem to be on every conceivable piece of stem, but for leaves! I once asked the bee experts why this *Lomatia* did not figure in the Honey Flora, but was informed that no data existed. Judging from the clouds of winged insects that rise from it when disturbed, I should say they get food easily, and honey in abundance.

At Belgrave early in the New Year I found a number of white-flowering Self-heal (*Brunella* or *Prunella vulgaris*). The colour is normally purple, and I have been trying to recall, but cannot, if I had previously seen white flowers. But a more pleasing find was an introduced Loosestrife, *Lythrum flexuosum* syn. *L. Graeffera*. This is not only the first record of it in Victoria, as the Government Botanist has kindly confirmed the determination and kept specimens, but it is also the first introduced *Lythrum* we have here. Its pretty six rosy petals are large, and if allowed to close naturally they crumple into the calyx very neatly, doubling up like a tiny, closed fist. New migrants are a cause of anxiety to stock owners and all of our *Lythrums*, both the two natives and this introduced one, beyond being free-seeders, and causing many plants to grow together, are not considered harmful or injurious to stock.

The *Lythraceae* or *Lythrum* family in Victoria are lowly plants, growing in watery places, but in some members of the family we know shrubs and trees, with the calyx tubular or campanulate, and about as many teeth as petals. The family, by the older botanists, was regarded as very close to the roses, but it will be seen that later botanists—as indeed by reading our own census—that it has been removed somewhat distantly from that family.

The *Lythrums* themselves, of which we have in Victoria the Purple or Spiked Loosestrife, the Small or Hyssop-leaved Loosestrife, and now the introduced Flexuous or Bending Loosestrife, all natives of Europe, Asia and America, are a family of very few species throughout the world. One of our natives—the Purple Loosestrife—is remarkable for its inconstancy. It may adopt as many as six different kinds of individuals affecting the stamens and styles. Long, medium and short—and, strangely, the differences are accompanied by alterations in colour, size and other conditions, as pointed out by Bentham.

A.J.T.

A NEW CALADENIA.

By (MRS.) EDITH COLEMAN.

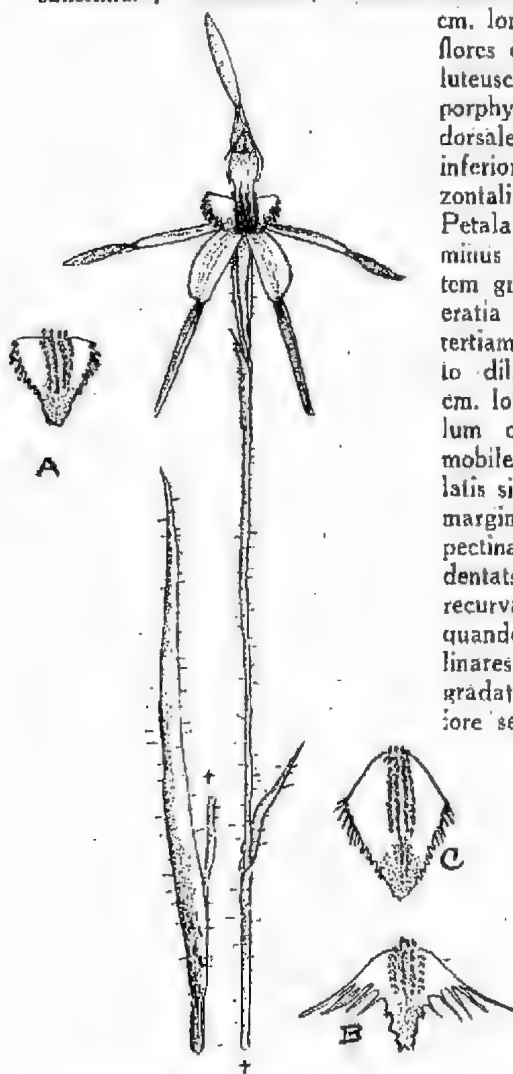
Caladenia longiclavata, n.sp., Coleman.

Planta terrestris robusta, 15-40 cm. alta, hirsuta, Folium hirsutissimum, lanceolatum; bracteae caulinae 2 vel 3 foliaceae, 3.5

cm. longae. Flos solitarius vel flores duo. Perianth segmenta luteuscula linea longitudinali porphyrea in medio. Sepalum dorsale 3.5 cm. longum, dimidio inferiore erectum deinde horizontaliter productum incurvatum. Petala ac sepala lateralibus haud minus tertiam longitudinis partem graviter clavata; sepala lateralibus 3.5 cm. longa circiter tertiam longitudinis partem multo dilatata; petala lateralibus 3 cm. longa vix dilatata. Labellum ovatum luteusculum haud mobile sine lobis lateralibus latis sicut ac *C. dilatata*, R.Br., marginibus in dimidio posteriore pectinatis deinde versus apicem dentatis vel serratis, apex multo recurvatus, calli 4 vel (aliquando) 6-seriati, reflexi carnei lineares basi longissimi superius gradatim breviores vel anteriore sessiles, lamina apice nudo.

Columna incurva supra late alata angustius infra; basi 2 glandulis luteis. Anthera breviter mucronata.

Locality: West Australia, Russelton, Capel, Dunnybrook, Augusta, Forest Grove, Boyup Brook. September, October, 1928, 1929.



Caladenia longiclavata, n.sp., COLEMAN.

A. Labellum of *C. longiclavata*.

B. Labellum of *C. dilatata*.

C. Labellum of *C. dilatata*, var. *rhomboidiformis*, n. var.

Plant terrestrial, robust, 15-40 cm. high, hairy. Leaf very

hairy, lanceolate; two or three well developed leaf-like bracts 3.5 cm. long. Flowers 1-2, maroon and yellow. Perianth segments slightly spreading, except the dorsal sepal, which is erect and incurved, yellowish with wide, red, central stripes; sepals and petals longly and heavily clavate for more than one-third their length; lateral sepals 3.5 cm. long, widely dilated for about one-third their length, scarcely spreading, often pendent; dorsal sepal 3.5 cm. long, erect, then incurved; petals also clavate, 3 cm. long, scarcely dilated.

Labellum ovate, yellowish, apex and calli maroon, not tremulous, no wide lateral lobes as in *C. dilatata*, R.Br.; lateral margins pectinate posteriorly, gradually shortening into dentate or serrate towards the apex; apex much recurved; calli arranged in four rows, rarely six, bent. Column incurved, widely winged above, more narrowly below, two yellow orbicular glands at the base. Anther shortly mucronate.

The new species is abundant in all of the districts mentioned. The short perianth segments with their long clavate points, and the small yellow and red labellum are prominent features. The type is in the Melbourne Herbarium.

Caladenia dilatata, R.Br., var. *rhomboidiformis*, Coleman,
n. var.

Species gracilis typo colore similis sed perianthi segmentis brevioribus latoribus sepalis lateralibus pendentibus liberis haud palentibus neque deflexis sicut ac in *C. dilatata*, R.Br. Labellum rhomboidale sine lobis lateralibus latis sine etiam conspicuis typi pectinibus, pars marginis parva anterioris integra pars dilatata breviter fimbriata.

Locality: West Australia, Busselton, Capel, Forest Grove, Augusta, Boyup-Brook, Mundaring, Waterloo. September, October, 1928, 1929.

A slender variety resembling the type in colour, but with shorter, broader, perianth segments; lateral sepals pendent, neither crossed nor spreading, nor deflexed as in *C. dilatata*. Labellum rhomboidal, without the wide, green lateral lobes and combs of the type; a small portion only of its posterior margins entire; dilated portion shortly fimbriate, serrate towards the apex. Calli thick and fleshy. Abundant in all of the localities given, flowering rather earlier than the type. Specimens of the new variety are in the Melbourne Herbarium.

For specimens, September and October, 1928, I am indebted to Miss Edna Corker, Mr. C. Hill, Mr. S. Mitchell and Rev. E. Bryant. The drawings are from moist specimens.

NOTES ON SOME VICTORIAN ACACIAS.

By H. B. WILLIAMSON, F.L.S.

THE SECTION JULIFERÆ.

In this section are placed the species having their flowers in spikes, not in globular heads as in the great majority of Acacias. The section may be divided into two sub-sections, the first including the two with pungent-pointed phyllodia, viz., the common Prickly Moses, *A. verticillata*, with whorled needle-like phyllodia, and the equally common Spike Acacia, *A. Oxycedrus*, with broad phyllodia, not whorled. In the other division we have a small desert shrub, Mulga Acacia, *A. aneura*, with linear-compressed whitish pubescent phyllodia, which has probably not been collected in Victoria, the only specimens in the National Herbarium being labelled "Murray."

After eliminating the above named species, the remainder of the section may be further divided, placing in the first division the two rather rare north-eastern species, *A. Dallachiana* and *A. Doratoxylon*, which have their flowers very crowded in the spikes. The former, Catkin Acacia, is a tree 20-30 feet high, with large phyllodia 3-6 inches long and often 1 inch broad, somewhat falcate, rounded at the end, with 2-6 more or less prominent primary nerves with secondary veins conspicuously reticulate between. The spikes are quite sessile, 1-1½ in. long, usually in pairs and densely flowered. It appears to be confined to the summits and upper slopes of Mt. Buffalo. *A. Doratoxylon*, Currawang, is a tall shrub or small tree with long phyllodia, 4-8 in., about ¼ in. broad, and spikes resembling those of *A. Dallachiana*, but distinctly stalked. It occurs on the hills between Chiltern and Beechworth, rarely collected.

It is with the remaining forms of the section that confusion has been rife. Mueller enumerated them all as forms of Willdenow's *A. longifolia*, on the plea that many intermediates occur. Taking first the two extreme forms, *A. alpina*, F. v. M., and *A. longissima*, Wendl. (*A. linearis*, Sims) which Bentham in *Fl. Aust.*, II., pp. 397, 399, places as distinct species, we can separate the former, a truly alpine species common on Mt. Buffalo, by its short phyllodia, ¾-1 in., broadly obovate, finely 3-nerved, with numerous fine reticulations and its short, few-flowered spikes, and the latter, common in the ranges near Melbourne and the Southern and Eastern districts, by its long, narrow phyllodia sometimes up to a foot long and a line or two broad, either strictly 1-nerved or with only a faint accessory nerve on each side.

The Victorian forms enumerated by Bentham in *Fl. Aust.*, II., 398, as varieties of *A. longifolia*, Willd., are here specially under review. In Maiden and Betche's *Census of New South*

Wales Plants, 1916, p. 95, two of these, *Sophorae* and *floribunda* are given as varieties. Later, in his *Forest Flora of New South Wales*, Vol. VI., p. 154, Maiden discusses at length these and other forms, and states as his opinion that *floribunda* and *mucronata* should have specific rank. As the result of critical examination of many specimens in the National Herbarium and those recently collected by myself in the light of the discussion mentioned, I make the following suggestions.

A. LONGIFOLIA, Willd., var. *typica*, Bth., form common in cultivation. Phyllodia almost straight $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, 4-6 in. long with 2-3 rather prominent longitudinal nerves and several thinner secondary veins between them.

A. SOPHORAE, R.Br., differing from *A. longifolia* in phyllodia ovate-oblong very obtuse, thicker and harder, 2, rarely 3 in. long, $\frac{1}{2}$ -1 in. broad, more distinctly nerved, with smaller veins more prominently reticulate. Chiefly on the coast, often forming thickets on the hummocks.

A. PHLEBOPHYLLA, F. v. M. (*A. longifolia* var. *phlebophylla*, Bth.; *A. Sophorae* var. *montana*, F. v. M.), like *A. Sophorae*, but with much broader (often over $1\frac{1}{2}$ in.) phyllodia, more coriaceous, very obtuse and prominently reticulate. As the pod of this plant differs from that of *A. longifolia* and its allies in being broader and having distinctly flattened margins, not contracted between the seeds, the suggestion conveyed by Benthams, *Fl. Aust.*, II., 398, is here adopted. The plant occurs only among granite boulders on Mt. Buffalo. I suggest the vernacular name, Buffalo Sally.

A. FLORIBUNDA, Sieb., different in habit from *longifolia*, more bushy, with paler yellow flowers, and phyllodia narrower, of thinner texture, more finely streaked with less prominent primary veins, no marginal gland, flowers usually more distinct, and pod narrower and often of less hardness. Apparently from East Gippsland only, some specimens mistaken for *A. glaucescens*, which is not native to Victoria.

A. MUCRONATA, Willd. Phyllodia linear-oblong somewhat broader towards the end and blunt, rather stiff, thick, usually under 2 in. long with a short, sometimes recurved thorny tip, 3-nerved, scarcely veined between; glands obliterated. Occurs near the coast of Gippsland and Tasmania.

The three forms following may be placed as varieties of *A. mucronata*.

Var. *DEPENDENS*, Bth., with broader phyllodia (3 lines), usually with less prominent nerves; from Latrobe River; Corner Inlet, Mueller; Sperm Whale Head, F. Barton, junr., the last named more acute with more prominent nerves.

Var. *DISSITIFLORA* (*A. longifolia*, var. *dissitiflora*, Bth.), with phyllodia often very long, sometimes 8 in., 2-3 lines broad, 3-5-nerved, obtuse or acute, Gippsland; Lorne; A. C. F. Gates, Hall's Gap, Grampians. An interesting case of this form with a few phyllodia of the *longissima* type growing on the lower limbs was brought under my notice by F. Barton, junr., at Foster. This seems to justify to some extent Mueller's inclination to unite *longissima* with *longifolia*, and Maiden's opinion that "*mucronata* and *dissitiflora* are inextricably involved."

Var. *ACUTA*, n. var. *Variat phyllodiis linearibus 4-7 cm. longis basin versus paulo latioribus in mucronem fere pungentem desinentibus.* This is a form I recently collected at Hall's Gap, and which Mr. P. F. Morris also got near West Warburton. It differs from *mucronata* var. *typica* in having phyllodia spreading, linear, broader towards the base, and with a slender, almost pungent and sometimes recurved point.

SECTION BIPINNATAE.

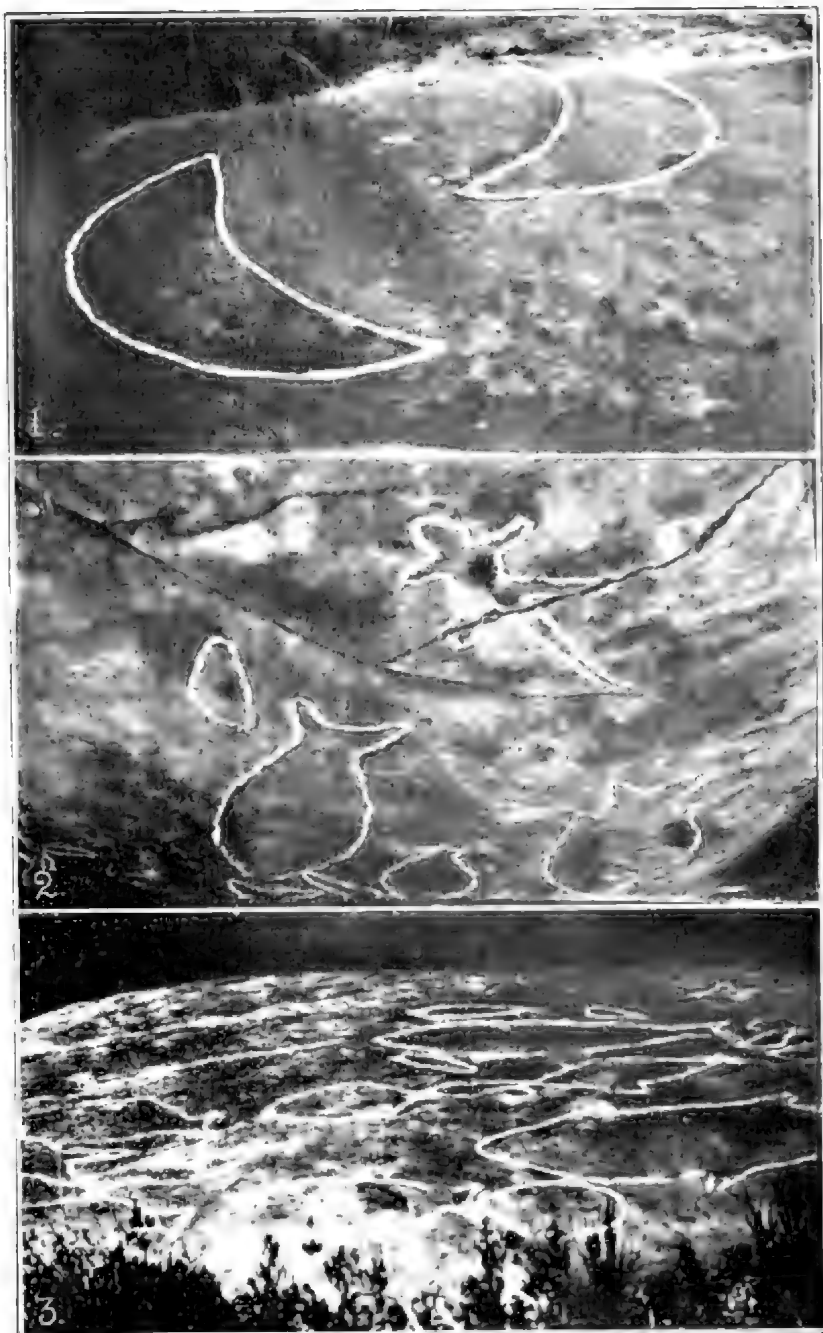
ACACIA DECURRENS and Its Allies.

This plant is placed on our Census as being recorded in all districts, evidently an error, which is due to *A. mollissima* being sometimes considered as var. *mollis* of *A. decurrens*, Willd. As it appears desirable to keep as separate species these two quite distinct plants their records for the various districts require revision. At the National Herbarium no Victorian specimen of the var. *normalis*, recorded in Bentham's *Flora*, "*Chiefly From Port Jackson*," is available, except some which are undoubtedly from parks and gardens. My own opinion is that *A. decurrens* (*normalis*) has not been collected as a spontaneous growth in this State, and that where it does occur it is the result of intentional introduction by settlers or persons interested in the plant as a shade or ornamental tree, or for the sake of its bark. The chief distinctions between the two trees are:—

A. DECURRENS, leaflets somewhat distant, almost glabrous, giving the tree a very green aspect; flowering time September and October.

A. MOLLISSIMA, leaflets softly tomentose shorter and more closely disposed; general aspect, pale green foliage; flowering time November and December.

A. decurrens is a far more handsome tree. Any information as to the spontaneous growth of the normal plant as an indigenous tree in Victoria supported by evidence of specimens, with particulars regarding their source, would be acceptable at the National Herbarium.



- (1) Rock Carving depicting an Eclipse (?), Elanora, near Narrabeen, N.S.W.
- (2) Rock Carvings, Kuring-gai Chase
- (3) Rock Carvings depicting a School of Fish, Kuring-gai Chase.

ABORIGINAL ART: THE EURO GROUP.

By B. L. HORNSHAW.

In Kuring-gai Chase, between Cowan Creek and Pittwater, about 35 miles from Sydney, are to be found some wonderful primitive "art galleries." One of the most interesting groups is situated near Euro Trigonometrical Station. Euro is an aboriginal word, meaning kangaroo.

After leaving the rough track off Pittwater Road, the first carving to be seen is one depicting a kangaroo, which is well executed (Fig. 1). About 100 yards to the west, on a large, flat rock appears a lizard and a shoal of fish, so well done that it is an easy matter to determine what the artist sought to portray. (Figs. 2 and 3.) Adjoining the last group is an irregular figure, probably meant to represent a deity. It is a very unusual type. (Fig. 4.)

These examples of nature art are all petroglyphs or rock carvings, but a little to the right of them was discovered a small rock shelter where several red hands had been stencilled. Owing to their great age and the weathering away of the face of the cave, only one hand pictograph is now complete. (Fig 5.)

In this locality usually we find these hand drawings in caves were done with a white or black pigment, so that those referred to above may be considered fairly uncommon. Probably the method employed in this work was to hold the hand flat against the rock and then blow the pigment (which was often mixed with human blood) on with the mouth.

We discovered a large carving representing a deity, which, on careful study, proved of great ethnological value. During my 20 years' quest for examples of aboriginal art, I have seen no other carving resembling this one, which is deeply cut and measures about nine feet in length. The upper portion is shaped like the head and bill of a platypus. The arms are outstretched, showing clearly a large boomerang in one hand, while the other points to the figure of a female. It is a fierce looking figure, and one longs to know its history, though even were its originator alive to-day he would not divulge the meaning; that could be learned only in the tribal initiation ceremony.

My conjecture is that this figure represented the totemic deity of the Kuring Tribe. (Fig. 6.) The female deity referred to had her arms extended upwards, with a circle attached to the left leg.

Smaller carvings of fish, and many others which we could not determine, were found some distance to the east of the main group. Here also were many grooves showing where the aborigines had sharpened their stone axes, in the dim and distant past.

After careful examination of these wonderful carvings and drawings, I am satisfied that this place had been used as a Bora ground for the initiation of the young men of the tribe, and that every carving was symbolic of their beliefs, or of hunting expeditions, regarded by them of great importance, for their very existence depended upon success in the chase.

Could we have but witnessed a few of the ceremonies that have been enacted around this Bora-ground, we would have seen some cruel and harsh treatment meted out to the young men.

These grounds were established on vantage points, to us rich in scenic value. In the same way modern peoples erect shrines and temples on elevated sites commanding fine views. There is nothing new in our ideas to-day. Much is said and written against the aborigines. We are told that they were practically too lazy to live. Inspect some of the native "art galleries" and you learn to respect the skill of the Lost Tribes.

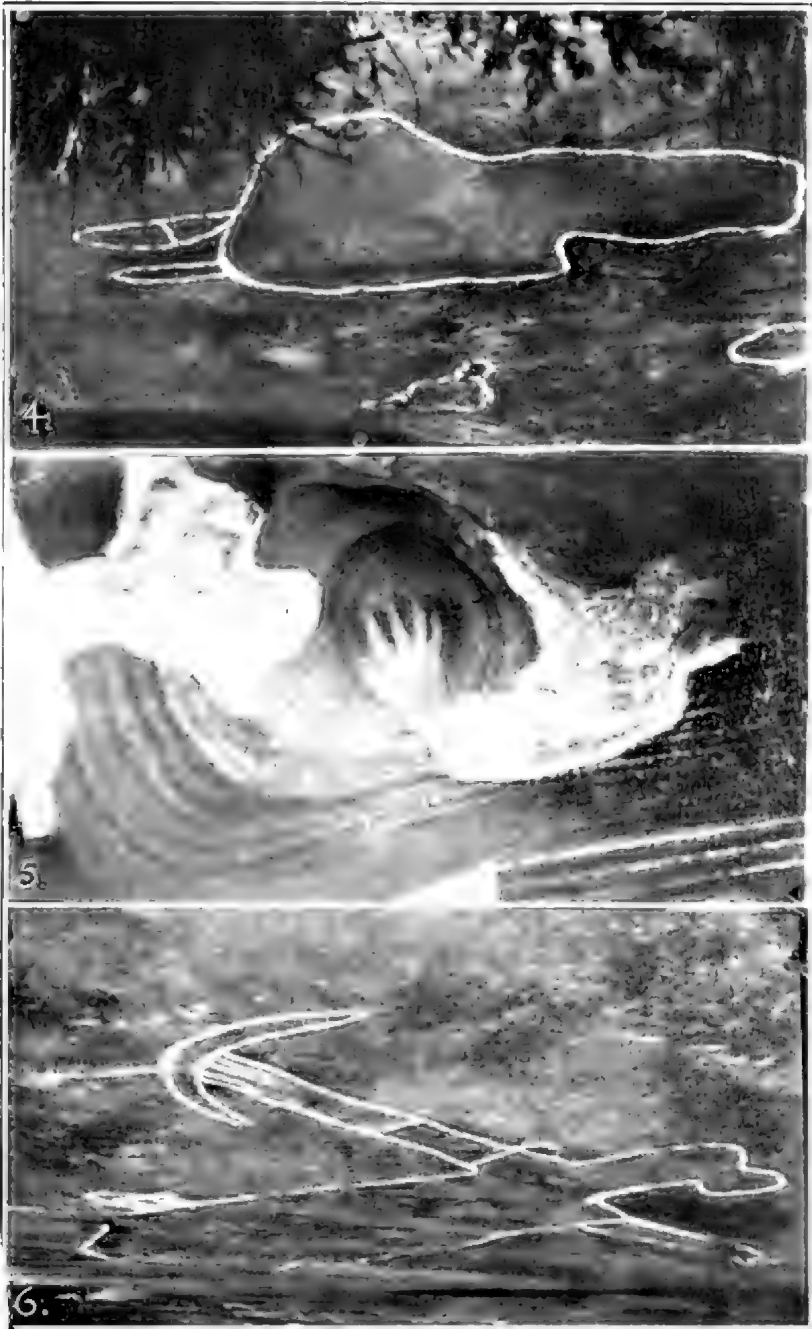
Editorial Note.—For some twenty years, as he tells us, Mr. Hornshaw has been searching for "art" relics of the aborigines. He has an unrivalled knowledge of the "galleries" around Sydney, and much further afield in New South Wales his quests have been successful. Many rock carvings and pictographs hitherto unknown to ethnologists have been discovered by this tireless amateur student of primitive art. His leisure time is spent largely in bush wanderings, where of old time the blacks had good hunting, and where, on sunlit rocks and in caverns they carved and painted the figures and "symbols" that intrigue us to-day.

Mr. Hornshaw has taken a large number of photographs of scientific value and general interest. Some are unique. Usually, he works far from beaten tracks, and, after miles of rough going may be rewarded by a "find" which makes the trip memorable. In a recent letter, he gives particulars of the latest discovery made by himself and two friends, about 10 miles from Manly. On a large, flat rock are 27 carvings and two native wells.

"This group," he writes, "was quite distinct from any other I have seen. It included pictures of kangaroos, a lyre bird (and I believe it to be the only one of its kind in New South Wales), a native cat, 10 flying-fishes, an Echidna, the tail of a lyre bird, a figure somewhat resembling a turtle, but apparently unfinished (being without the forelegs), a circle with 14 lines or tails protruding from it, another circle or loop with line 8 feet 2 inches in length attached, a boomerang, and what I think was meant to represent the feet marks of an emu."

Interest in aboriginal art is steadily increasing. Any member of the Club who may have photographs of carvings or pictographs, hitherto unpublished, is invited to send prints with explanatory notes, for the *Naturalist*.

—C.B.



(4) Rock Carving, Kuring-gai Chase.

(5) Rock Drawing in a rock shelter, Kuring-gai Chase

(6) Rock Carving depicting a Platypus Deity, Kuring-gai Chase.

POLLINATION OF SOME WEST AUSTRALIAN ORCHIDS.

By (MRS.) EDITH COLEMAN.

In a paper on the pollination of *Cryptostylis subulata* (*Victorian Naturalist*, July, 1929), I stated my belief that the ichneumon fly, *Lissopimpla semipunctata*, was responsible for the pollination of the Western Australian species *C. ovata*, R.Br. My observations have been continued by botanists in that State, and confirmation of my statement has come from Colonel B. T. Goadby (past president of the Western Australian Naturalists' Club). With his permission, I submit extracts from his letters:—

Cottesloe Beach, W.A., 2/12/29.

Dear Mrs. Coleman.

I am sure you will be interested to learn that *Cryptostylis ovata* is treated exactly in the same manner by the ichneumon fly, *Lissopimpla semipunctata*, as described by you in your papers on the pollination of *C. leptochila* and *C. subulata*. The following account will give you details:—

I had three pots containing *C. ovata* in flower. On November 28, about 10 a.m., the air being warm and still I placed the pots in the midst of my lucerne patch. Before ten minutes had passed I noticed an insect flying in a zig-zag fashion about five feet away. It suddenly made a straight dart to one of the flowers, and alighted with its tail to the base of the flower. Before it flew away I saw, with the magnifying glass, the pollinia attached to the end of the abdomen.

About ten minutes afterwards a second fly approached and settled on the labellum of another flower. It placed itself at first with its head towards the base of the flower, and then reversed itself and backed. I captured the fly and placed it in a bottle. It was identified by the Government Entomologist as *Lissopimpla semipunctata*. In this instance no pollinia were attached—probably I had not allowed it to remain long enough in the flower. About half an hour afterwards another fly alighted on a flower. After about half a minute I removed it with the forceps. I found two pollinia attached to the abdomen in the position as illustrated, Fig. 11, in your paper on *C. subulata*.

The flower is not unlike *C. subulata* in shape and size and colour, and the insect is upside down on the labellum. *C. ovata* does not grow in the vicinity of Cottesloe Beach. It is really a native of the S.W. of the State, from Bunbury to Albany. The ichneumon flies which visited the flower must, on the other hand, have been bred and hatched in the vicinity of Cottesloe Beach, over 100 miles from the locality of the orchids, yet these flies are urged to perform certain actions, of no use in themselves, in connection with a flower to which they are strangers, and in an exactly similar manner to that of other members of the same species, with orchids of another species, 1800 miles away.

It is an interesting problem, and one for which I think it is difficult to find a satisfactory solution. What is the object of the procedure? I don't yet accept the "sex instinct" theory. I am glad to give you these details as they link up so well with what you have already brought to light.

11/12/29—I have put the *Cryptostylis ovata* out in the garden on two more occasions since writing to you, but the results have been negative. The insects have alighted on the flowers, but no more.

17/12/29—Since writing to you last I had an opportunity one morning of making some further observations on *C. ovata* under very favourable con-

ditions, and what I saw converted me entirely to your views. In West Australia your discovery is now claiming attention from quite a number of persons.

One fly went straight to the flower and backed smartly to the base of the flower. It remained in this position for some time, possibly a minute, its forelegs clasping the rolled margins of the labellum, its abdomen pressed close to the groove in the labellum, and the tip of the abdomen pressed apparently into the stigma. Its head was not in contact with the flower, but well away from it. . . . These flies were all the time under observation through a magnifying glass, and all details were clearly seen. They were not disturbed by the close proximity of glass or hand.

Pollination of Caladenia Barbarossae (Reichb. f.
Beitr. 64).

While I was on a recent visit to the south west of Western Australia, some specimens of the orchid *Caladenia Barbarossae* were sent to me. On two occasions I saw a small bee, or fly, visit these flowers, and from their actions I have no hesitation in advancing the theory that they were actuated by similar motives to those of the insects concerned in the pollination of the various species of *Cryptostylis*.

No pollen was removed, but had it been taken it must, from the direct position of the insect, have been removed on the head or back of the insect.

Unfortunately, having no forceps or killing bottle with me, I hesitated too long and lost both insects. Both were much darker in colour than *Lissopimpla semipunctata* and more bee-like. They resembled certain small *Halictus* bees that visit some of our Victorian orchids. The abdomen appeared to be imbedded in the calli on the labellum of the orchid, and though the head of the insect was quite close to the prominent basal appendages, it was not touching them.

From this, and from certain movements, it was clear to me that the insect was not interested in edible tissue, nor was the close grip of the body on the labellum necessary for the purpose of merely resting. There could, to my mind, be only one possible reason for the visit.

I brought the orchids to Victoria on my return, hoping to learn something further concerning their pollination, but they were not fresh enough for the purpose. Western Australian botanists may be able to complete the observations.

I hope shortly to submit notes on the pollination of *Caladenia dilatata* var. *rhomboidiformis*, under very similar circumstances, which is visited by a large black ichneumon fly, the body of which is banded with yellow.

The matter of this strange method of pollination is thus not so remarkable as we have thought. Without going too deeply into the reason for the strange behaviour, one might consider first how little we really know of insects and the laws that govern

them. Upon one thing many of us are agreed, that their actions are largely mechanical. They act as they do because they can act in no other way. There are certain exceptions of which I hope to write in another paper. There can, at least, be no question of applying to insects the rules that govern our own lives.

One thing seems to me to bear very closely upon the subject. In many species of ichneumonids the males emerge considerably in advance of the females, and in greatly larger numbers. I have had under observation some egg-cases of the common mantis, *Archimantis latistylis*, which had been parasitised by certain small wasps (Chalcids). In every instance the male Chalcids emerged a day, or several days, before the females, and greatly exceeded them in numbers.

Under normal conditions it is not unreasonable to assume that the actions of these males would be governed by two predominant needs—food and reproduction—and the satisfying of both would be largely involuntary or mechanical, not deliberate or purposive. In almost every instance under my observation the action of the insect has been swift, without apparent deliberation. Thus, whether they are attracted to the flowers by scent or fancied resemblance to females of their kind, their actions can perhaps be understood. It would be easy to suggest a "popular" theory, but the subject calls for scientific interpretation.

With but a superficial knowledge of entomology one is impressed with the remarkable success of the insect in almost every part of the world. If man is to combat their rapid multiplication, their wonderful adaptability to conditions prevailing in lands new to them, he must shirk no field of research that may throw light on the most insignificant of their customs.

The subject of pollination is full of interest—and problems. It is not suggested that orchids are never visited by insects in search of edible tissue.

In flowers of *Diuris pendunculata* one may frequently find as many as three or four small *Halictus* bees, *Halticus lanarius*, which are not held fast by viscid matter but appear to be stupefied remaining so for several hours after being taken from the flowers. I am submitting some of these to Mr. Rayment for examination. So far I think they have all been of one sex.

In conclusion, I quote from a letter written by Dr. R. S. Rogers, M.A., M.D., F.L.S., to Colonel M. J. Godfery, F.L.S., who has for many years been working on the pollination of orchids: "Mrs. Coleman and I are in complete agreement with regard to the facts, and I fail to see what other interpretation can be placed on them." (*Orchid Review*, June, 1929.)

As I told Colonel Godfery, I fancied that Dr. Rogers was at first only gently tolerant of my views, and I was very glad

to have his confirmation of my theory, as well as that of Dr. Tillyard, our Australian expert in entomology.

Lord Rothschild, who also had been unable to accept the idea, in a letter to me on the subject, writes:—"I am now convinced that Colonel Godfrey was correct in his ideas, and that you also are right." Lord Rothschild offers a theory which may be correct, one which would certainly simplify the solution of the problem concerning the often-repeated insect visits.

20/1/30—Since writing the foregoing I have witnessed the removal of the pollen from the N.S.W. representative of the genus, *Cryptostylis erecta* R.Br., by the insect *Lissopimpla semipunctata*. In this case the insect is nearly upright, and though it assumes the direct position the pollen is removed on the tip of the abdomen, as in the instances previously described.

It has now been shown that the four species of the genus are visited by the same ichneumon.

CITY FERNS.

Some time ago a note appeared in the *Naturalist* under this heading, and it may interest members to know that a small fern is to be seen growing in a crevice of the stone fence of Scots Church, facing Russell Street. Passing along this frontage one day, in the spring of 1928, I noticed a little green patch against the stones, and found that it was a very small fern, just two or three tiny fronds. Each time I passed the spot—at intervals of two or three weeks perhaps—I noted it, but at last came a day when it was missing, and I concluded that the summer's heat had withered it, or perhaps it had been torn off or destroyed. Last year I watched for its reappearance, but it was not until January 10, 1930, that I saw it again. It is now a much larger plant, and looks robust. It will be interesting to see how long it will live in that dry spot—for several months probably, unless someone, not a nature lover, observes it and breaks it off.

Z.McT.

EXCURSION TO BOTANIC GARDENS.

About fifteen members and friends, including some members of the Aquarium Society, visited the Botanic Gardens on the afternoon of Saturday, December 7. Operations were restricted to various parts of the large lake, and resulted in the collection of some interesting material.

Some noteworthy forms were taken. Protozoa included *Trachelius ovum*, in which the cytoplasm is of an extraordinarily vacuolar nature. Numerous colonies of *Epistylis plicatilis* were also found. This protozoon receives its specific name from the concertina-like method in which it folds up on retraction. These colonies were so old that numbers of rotifers of the genus *Ecistes* had constructed tubes on their stalks.

Some stray leaves of *Vallisneria* furnished numerous specimens of the hydroid *Hydra vulgaris*; and as the protozoon *Plumatella repens* was also taken, the difference in the structure of these outwardly similar forms was explained. Among the other rotifers noted were many colonies of a *Lacinularia*, probably *L. socialis*, and also *Brachionus pala*. The very beautiful organism, *Volutax*, which for years past has been obtainable in the lake, was conspicuous by its absence, strange to say.

J. STICKLAND.

BARYTIC REPLACEMENT OF MARINE FOSSILS.

By S. R. MITCHELL.

Barium sulphate is a somewhat unusual mineral to be found replacing the hard parts of marine fossils. Examples have recently been found locally, and as such an occurrence has not hitherto been observed in Australia to my knowledge, this note will serve to place it on record.

During a recent examination of the country north of the Yarra near Woori Yallock, a bed of decomposed rock was noticed in which a channel had been eroded. On the sides and bottom of this channel numerous hard concretions and irregularly shaped pieces, ranging in size from 75 m.m. to minute particles, remained from the washing away of the soft clay, and among them were some well defined marine fossils. These included small cephalopods, fragments of corals, bryozoa, and some internal casts of small brachiopods.

One specimen proved to be a very interesting mushroom-shaped piece of the coral *Favosites*, showing perfect preservation of the cell structure. It measures 45 mms. across. The cephalopods belong to the genus *Orthoceras*, and do not exceed 25 mm. in length and 6-7 mm. in diameter. The brachiopods and other forms are far too indistinct for specific determination.

Being engaged in the search for limestone in the district, tests were made to ascertain whether calcium carbonate was present, but with negative results. Further investigation showed that there was barium sulphate in all of the material examined. Some small but characteristic rhombic crystals of barite were detected, while other specimens exhibited the well-defined cleavage and lustre of this mineral.

The specific gravity determination gave low figures, consequent on the amount of impurity admixed with the barium sulphate, but were high enough to confirm the identifications of this mineral, in conjunction with the other characteristics noted. The interest of the occurrence lies in the fact that the original substance of the hard portions of these organisms, probably calcium carbonate, has been almost wholly replaced by barium sulphate, a form of replacement not common in regard to fossiliferous occurrences.

In all probability the bed containing these barytic replacements was originally a calcareous mudstone, somewhat similar to those rocks exposed in the small quarries on the Melbourne road near Seville. It was in these beds that some giant trilobite remains were found. Atmospheric and other agencies have resulted in the alterations and decomposition of the mudstone to clay, the removal of much of the calcium carbonate, the replacement of portion of it by barium sulphate, and the segregation of this mineral

in a concretinary form. Iron sulphide as pyrites occurs in these beds in appreciable quantities.

Barite as a cementing material in sandstones is not unusual; specific instances are known from various parts of the world.

G. W. Dickson (*School of Mines Quarterly*, Vol. 23, 1902, p. 366) states that barium sulphate is produced when a bicarbonate solution comes in contact with oxidising pyrite, and its presence in limestone may be due to a possible coincidence of the two reactions. The absence of calcium carbonate in the Woori Yallock deposit suggests complete replacement and possibly the fact that the mudstone was less calcareous than siliceous. The oxidising pyrite transforms the calcium carbonate to a calcium sulphate (none of which was detached at Woori Yallock), which undergoes double decomposition with the percolating barium solution.

Since the original source of the barium is the felspar and mica of crystalline rocks, their presence is to be inferred in connection with the Woori Yallock occurrence. The apparent localisation of the baryte bed suggests the proximity of an igneous intrusion, and it will be interesting to examine the area closely to ascertain whether such exists. Certain it is that the corals cephalopods and bryozoa were originally composed of calcium carbonate in their hard parts, so that Dickson's synthesis is reasonably applicable to this occurrence.

The rocks in the vicinity of Woori Yallock consist of mudstones, sandstones, shales and quartzites of Silurian age. The prevailing strikes N. 10 deg. W., with an almost vertical dip. The quartzite on the flanks of Mt. Tool-be-wong contain numerous faint casts of brachiopods.

A London friend of a well known Melbourne surgeon has made repeated, but unsuccessful, attempts to obtain, for research purposes, seed of *Cynoglossum australe*, Sweet Hounds-tongue, a fairly common native plant, belonging to the Boraginaceæ, the Borage family.

The plant is an erect perennial from 6 in. to 1½ ft. high, with lance or oblong shaped leaves. The basal leaves are 4 to 6 inches long, the upper ones shorter, and without a stalk. The flowers are white or pale yellow, very much like the "Forget-me-not," which has blue flowers. The fruit is made up of four nutlets, although sometimes these are reduced to one or two. The nutlets are ovoid, densely prickly on the outer face; they are compressed and joined together by a cord attached to the base of the head. Another species, *C. australe*, Austral Hounds-tongue, has blue flowers. Both the herbs are hairy and rough to the touch.

I would be pleased if any members of our Club could obtain specimens of the plant in seed, and forward them to me at the National Herbarium, South Yarra. The plant was once distributed throughout Victoria and New South Wales, but cultivation has killed most of it.

P. F. MORRIS

EXCURSION TO MALLACOOTA INLET.

Owing to the difficulty of securing accommodation at Christmas time, unless early reservations are made, it was found impracticable to include in the party a number of intending excursionists who gave in their names too late. However, on December 25, nine members left for Mallacoota, by road. The journey, which occupied two days, was broken at Bairnsdale, where we had the pleasure of renewing the acquaintance of a member of the Club, Mr. Ed. Cox, who had arranged for the accommodation of the party overnight. The tediousness of covering the long distance of approximately 340 miles was minimised as far as possible by stops at various points en route, the more enthusiastic members devoting the time to collecting specimens and observing. At our destination were Mr. and Mrs. W. Hanks, who had preceded the main party.

Excursions were arranged for each day, one whole day, and one half-day being spent in visiting other parts of the Inlet by motor launch. An all-day trip to where the Bedka River joins the open ocean, some seven miles from the guest house, proved most interesting and enjoyable. On this occasion, and also on other "land" excursions, the kindly co-operation of Mr. Hanks made it possible for all members of the party to travel in the private cars.

On Saturday morning, December 26, a decided earth tremor was felt, accompanied by a rumbling sound. This was interesting in view of the fact that a similar earth tremor was reported to have been experienced at Flinders Island at approximately the same time.

Insects:—Miss J. Raff, who was a member of the party, writes:—Beetles were by far the most common group of insects collected on the trip, and were very plentiful, especially in the blooms of the *Burraia*, where the families Mordellidae (pintail beetles), Buprestidae (jewel beetles), Cerambycidae (longicorns) and Chrysomelidae (leaf beetles) were well represented. Buprestids were also seen on the flowers of *Cassinia* (dogwood), and large-sized weevils were obtained from an *Acacia* (possibly *A. longifolia*) on the sand dunes near the entrance. This *Acacia* was also heavily infested with a species of leop insect, which, in turn had its natural enemy, one of the lady-birds, feeding on it.

The *Eucalyptus* seemed particularly healthy, the only insect of any consequence on them being the saw-fly, larvae of which were found in various stages of growth. Of flies (other than mosquitoes), the commonest form, was a medium-sized Crane-fly, found in abundance among the low growing scrub.

The Bug-Order (Hemiptera) was represented by large numbers of Tingidae or Lace-bugs, infesting the leaves of the Lilly-pillies. Cicada "skins" of both a large and a small species were found from time to time, but the weather seemed scarcely warm enough to expect to find the adults.

Ant-lion larvae attracted much attention. At Providence Ponds, on sandy ridges by the roadside, numbers of pits were noticed, and from these several larvae and two cocoons were secured. White-ant nests, or termitaria, of fair size were very common; generally built against the remains of standing trees, but, strangely, these appeared to be uninhabited, until a geological bather was used on the mound, when some of the galleries were reached and a few worker termites were found. The termitaria, in places, lent a distinctive feature to the landscape.

Of shore forms, an interesting "find" was an eatwig (one of the Dermaptera) of sandy colour, and with remarkably long hind forceps or pincers. Several specimens of these were secured from beneath boards and pieces of drift-wood lying about on the beach.

Plants:—Report by Mr. H. B. Williamson. Nearly sixty species of plants were handed to me, the most interesting of which are:—*Xyris gracilis*; *Sowerbaea juncea*; *Scheuchzeria undulata* (in fruit), a lily rare in the east; the *Heron*

Bristle-rush, *Chorizandra nymbaria*, recorded from the S.W., S. and East, but rarely collected; two rare *Geebung*s found only in the east, *Persoonia salicina* and *P. linearis*; two *Xanthosias*, *X. pusilla* and *X. pilosa*, the latter rather rare in the S. and East; the little trailing plant, *Tylaphara barhata*, known only in East Gippsland; a very broad-leaved form of *Stachhouisia mamogyna*; *Baccharis linifolia*, found only in the East; other plants most noticeable for their showy flowers were *Scaevola hispida*, very fine; *Boronia Muelleri*, *Dampiera striata*, *Epacris lanuginosa*, *Kunzea peduncularis*, *Bredemeyera ericinum*, *Trachymene Billardieri* and *Lomatia ilicifolia*. Fruiting specimens of *Acacia suaveolens*, *A. botrycephala* (*A. discolor*) Sunshine Wattle and the graceful *A. suberosa* were gathered. Of Orchids seven species, including *Dipodium punctatum*, *Calceana major* and *Prasoclyptum australe*, were taken.

Birds.—Bird life was both varied and numerous. On The Inlet, large numbers of Black Swan, *Chenopsis atrata*, fed fearlessly on the sand-banks undisturbed by the approach of the motor-launch. Other aquatic birds noted were the Caspian Tern, *Hydroprogne caspia*, Pelican, *Pelecanus conspicillatus*, Silver Gull, *Larus novaehollandiae*, Pacific Gull, *Cobanius pacificus*, Black Cormorant, *Phalacrocorax carbo*, and White-breasted Cormorant, *P. fuscescens*, White-fronted Herons, *Notophox novaehollandiae*, and White-breasted Sea Eagles, *Haliaeetus leucogaster* were seen.

At Maffra, numbers of Red Wattle birds, *Anthochaera carunculata*, were observed feeding on the magnificent flowering specimens of *Grevillea robusta* with which the streets were planted. Residents allege that this bird is destructive in orchards. The gloriously-plumaged Rainbow Lorikeet, *Trichoglossus moluccanus*, which is also brush-tongued, was certainly damaging unripe pears and apples, both at Mallacoota, and at Genoa River. The three Fantails, the Grey, *Rhipidura flabellifera*, the Black and White, *R. leucophrys*, and the Rufous, *R. rufifrons*, were listed, also many small birds, Blue Wrens, Silver Eyes, Thornbills and Pardalotes. Of Cuckoos, the Black-eared, *Owenavis osculans*, as well as the Pallid, *Cuculus pallidus*, Fan-tailed, *Coccyzus flabelliformis*, and Bronze-cuckoo, *Chalcites basileus*, were listed. A notable find was the moss-covered nest and eggs of the Black-faced Flycatcher, *Manarchia melanopsis*. A good opportunity of observing the Gang-gang Cockatoo, *Callocephalon fimbriatum*, arose through the finding of a young male with bright red crest, which had evidently fallen from the nesting hollow, both parents remaining in the vicinity. Flocks of White-winged Choughs, *Corcorax melanorhynchus*, and Pied Bell-magpies, *Strepera graculina*, were conspicuous; as also was the Yellow-tailed Black Cockatoo, *Calyptorhynchus funereus*. Whip-birds, *Psophodes olivaceus*, frequented the bracken close to the guest house, and the Eastern Spinebill, as well as various other species of Honeyeaters frequented the garden. Large flocks of Starlings were a feature of the whole trip, Sparrows and Goldfinches also having penetrated to this interesting south-eastern corner of Victoria.

V. H. MILLER.

WISE. FROGS.

The pool at the Flagstaff Gardens is surrounded by a low cement border accessible all round, except one portion, where a flower-bed comes to the edge, and is protected by a spiked, iron fence. Many children fish in the shallow water with hand-nets, and the carp are nearly all gone. On a recent visit, the protected portion of the bank was literally plastered with large green frogs basking in the sunlight. The only way to approach them is to wade the pool, but any attempt to do so, in the words of a small boy, "sends them all jumping in."

A.E.R.

EXCURSION TO GEMBROOK.

The excursion to Gembrook on December 14 was attended by seven members, and was marred somewhat by rainy weather. To many visitors a day's trip in the little Gembrook train is interesting, the snaky winding of the narrow steel road being quite fascinating. There are places where from one side a very fine, extended view is obtained, and where at the same time close proximity of the vegetation on the other side gives the botanist a good chance of identifying many of the plants, this being increased by the slow speed of the train. The prevailing features of this vegetation are tall Eucalypts, often crowded Bracken and Blackberry tangles interspersed with many native shrubs, among which the predominating colours are white flowers of Blackberry and Cassinias (*C. aculeata* and *C. longifolia*), and yellow masses of *Senecio dryadeus* and *Goodenia ovata*.

A few patches of the yellow Rice flower, *P. flava* and the Wrey Bauers can be seen, but it is too late for the bright yellow or red blossoms of the Daviesias and other leguminous shrubs, though of Golden Spray, *Pininaria*, a few shrubs were noted in swampy places near the line. The aggressive Blackberry bids fair to overwhelm everything, and one cannot but sympathise with those who are making homes in the hills. Together with the features mentioned, if we take into account the varied reddish, sometimes even gorgeous, tints of the young gum tips, the dark green foliage of the Narrow-leaf Acacias, and the bluish leaves of the young Silver Wattles, interspersed with the dark brown or black sprays of Thatch Sedge, one can understand why lovers of the bush make the slow journey without feeling bored. The view of the fine nurseries near Emerald with the *Phormium* plantations and the neat *Veronica* hedges makes a pleasing break, but the view when Gembrook is reached is rather disappointing to the botanist, who looks out on wide grazing or cultivation paddocks cut through here and there by remains of fern gullies.

It was in one of these gullies near the township that we made our way, and in which, after lunch, some interesting plants and birds were noted. The gully is almost devoid of small ferns, and the two common tree ferns are not numerous, owing probably to its proximity to a railway station. Notices prohibiting the removal of ferns are posted, and close by one of these was seen the decapitated head of a *Dicksonia*, still fronding, though not planted, presenting what will probably prove too great a temptation to some visitor. The sides of the gully are clothed with a good deal of tangled Hazel, Musk, Austral Mulberry, etc., none of which appears in a very healthy condition. Two cruciferous plants, *Cardamine dictyosperma* and *C. stylosa*, were growing in profusion, the former distinguished by its pinnate basal leaves and larger flowers, and in patches on the compost of dead leaves there was abundance of Forest Star-wort, *Stellaria flaccida*, Smooth Nettle, *Australina Muellerei*, and Scrub Nettle, *Urtica incisa*. Plants of White Elderberry, *Sambucus Gaudichaudiana*, were just coming into bloom. The Giant Mountain Grass, *Glyceria dives*, was seen up to eight feet in height, and fine flowering specimens of the Tall Sward-sedge, *Lepidosperma elatius*, with its six-foot stems and ample panicles, were collected. Large patches of Liverwort, *Marchantia polymorpha*, were showing antheridial and archegonial heads, and on a tree fern the Green Bird-orchid, *Chiloglottis Muellerei*, was just opening in flower. Two interesting introduced plants were met with, one near the gully mentioned, Salad Burnet, *Poterium Sanguisorba*, and the other while the locomotive was taking water, Cluster-flowered Vervain, *Verbena bonariensis*, a tall, harsh plant with small clusters of blue flowers, now quite common in the Dandenongs. *Verbena venosa*, a closely allied species, collected near Beaconsfield recently, differs from the former in having its corolla tube being scarcely exerted.

H. B. WILLIAMSON.

SILVEREYES' WAYS.

Our familiar Silvereyes, *Zosterops lateralis*, are charming little birds—graceful in movements, dainty in habits. I enjoy watching a company of them fossicking for food in the gardens or amongst the scrub. But ask for an orchardist's opinion! "Little terrors for figs and grapes," is usually the verdict. Any bird that helps itself, even in the smallest degree, to fruit of the orchard, is generally proclaimed a pest by fruitgrowers, who seemingly fail to notice the great amount of service rendered, in orchard and garden, by many of the species.

I certainly admit that the Silvereye is fond of soft fruits; several times have I watched one excavating a nice, juicy fig, making a small aperture at the end, and feasting on the ripe flesh inside, until only the skin remained—almost intact. But fruit forms only a part of the Silvereye's diet. The title "Blight-bird," sometimes given to this species, is certainly justified, as Silvereyes relish both the Woolly-aphis and Rose-aphis. I have seen them devouring these pests quite readily, pecking them from the branches with remarkable nimbleness. The value of a flock of these birds in the garden, or orchard, is incalculable. They must destroy many undesirable insects besides those I have named.

Fruit has probably been on the Silvereyes' "menu" for a great many years, as the orchard is not their only resource for this kind of food, in the bush they eat various "wild" fruits. Recently, at Turton's Creek, thirteen miles from Foster, a number of Silvereyes flew from a shrub on the roadside: I had interrupted their luncheon of *Coprosma Billardieri* berries! I think the larger fruits of *Coprosma hirtella* are also relished, besides several other native berries.

An interesting fact concerning the Silvereye is the close partnership which exists between it and members of the Finch family (*Ploceidae*). I have noticed both Red-browed, and Beautiful, Firetails accompanying parties of Silvereyes, and associating as though they were of the same species.

"Zosterops" is not usually included among our song-birds. Nevertheless, its notes are distinctive, pleasant, and are familiar to most country folk. But do bird observers know that the Silvereye is capable of mimicry?

Recently listening to what seemed to be a chorus of distant bird-voices, I discovered that a Silvereye, only a few yards from me, was responsible for it all. Among the bird-calls imitated I detected the song of the Speckled Warbler, the grating cry of the Nankeen Kestrel, the gurgling notes of a Starling and portion of the Blackbird's song. The imitations, though feeble, were remarkably exact.

FRED BARTON, Jun.

BABY KOOKABURRAS.

On January 24 two young Kookaburras were noticed in the Fitzroy Gardens. They were rather weak on the wing, and one that flew to the grass was easily caught. Beyond an indignant peck or two, it did not seem at all alarmed, and remained quiet in my hands. On the last two days only one could be found. Doubtless the half-wild cats which haunt the gully have accounted for the other. The remaining bird is now (January 30) strong on the wing, but very clumsy in alighting, having only about an inch of tail. A volplane to the ground generally ends in a crash. Its efforts to acquire the tribal song cause considerable amusement to the lunch-hour habitués of the Gardens.

A.E.R.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, February 10, 1930. Mr. Geo. Coghill occupied the chair and about 100 members and visitors were present.

CORRESPONDENCE.

From the Minister for Forests fixing February 11 as the date of the deputation in connection with the reservation of the Cumberland Valley as a National Park.

From the Victorian Town Planning Association, inviting representation by the Club at a deputation to the Minister for Lands on February 13, regarding reservations at Wingan Inlet and the Dandenong Police Paddock. Messrs. G. Coghill and A. E. Keep were nominated as representatives.

REPORTS.

Reports of excursions were given as follow:—Seaholm, General, Mr. A. E. Rodda; Flinders, Geology, etc., Mr. S. R. Mitchell; Oakleigh Golf Links, Botany; Mr. F. C. A. Barnard.

GENERAL.

The chairman welcomed Mr. J. Hill, of Murtoa, and Mr. A. N. Burns, of Queensland, country members of the Club. In replying, Mr. Hill spoke of the great destruction of game birds, particularly ducks and quail, in the open season, and suggested that greater protection be sought for them.

Dr. H. Flecker referred to a leaflet issued to citizens by the Ku-ring-gai (New South Wales) Municipal Council, urging the protection of trees and shrubs, particularly Australian species, throughout the municipality. He suggested that this example should be followed in Victoria.

LECTURETTES.

With the object of encouraging beginners in the study of some branch of natural science, short lecturettes were given by Mr. F. E. Wilson, F.E.S., and Mr. C. J. Gabriel. Mr. Wilson spoke on Insect Collecting and gave some useful hints to beginners in the study of entomology. Mr. Gabriel gave a lecturette on Conchology, which was illustrated by coloured drawings and a fine exhibit of shells.

EXHIBITS.

By Mr. T. S. Hart.—Specimens of *Sparganium ramosum* collected by Mr. J. W. Rickard on the Mitchell River flats, previously recorded only from the S.W. district; *Sarcopetalum Harveyanum*, *Vitis hypoglauca*, *Tieghemopanax sambucifolius*, very large-leaved form, *Goodenia humilis* and *Cratiola peruviana* var. *pumila* collected at Orbost.

By Mr. A. S. Kenyon.—Some implements from South Africa; stone club from California; stone club head from New South Wales.

By Mr. H. B. Williamson.—Dried specimens illustrating the exhibitor's article on Acacias (section *Julifera*) in the February *Naturalist*.

By Mr. F. G. A. Barnard.—Hyacinth Orchid, *Dipodium punctatum*, from Croydon—two racemes with green stems and pale flowers without dots.

By Mr. A. S. Blake.—*Eucalyptus macrocarpa*.

By Mr. Chas. Daley.—Sturt's Desert Rose *Cienfugasia hakeifolia*; Fairy Wax-flower, *Eriostemon obovalis*, blooming in January and February, grown at Caulfield by the exhibitor.

By Mr. S. R. Mitchell.—Zeolites from the basalt, and fossils from the polyzoal limestone at Flinders.

By Master Pat Flecker.—Live frogs from Elsternwick.

By Mr. A. N. Burns.—Case of butterflies from Queensland.

By Mr. F. Pitcher.—(a) Strap fern, *Blechnum Patersonii*, collected at Marysville and grown by the exhibitor; Sea Dragon, *Phyllopteryx foliatus*, found at Cape Schanck by D. Fearon.

By Mr. W. H. Nicholls.—*Prasophyllum Archeri*, Hooker, 14 inches high, bearing 22 flowers in a spike measuring 2 inches by 5/8 inch, collected on the Pyrete Range near Gisborne, January 27, 1930, growing on a very dry rocky hillside. Tubers measured each 1 1/8 inches in diameter.

JUBILEE EXHIBITION.

Fifty years ago our Club was founded, and its jubilee is to be fittingly celebrated in June, by a three days' Exhibition in the St. Kilda Town Hall. A jubilee dinner is also being arranged, and representatives of kindred societies will be invited.

A sub-committee has already made preliminary plans for the Exhibition, which will be on novel lines. It is proposed to have a number of live exhibits, including a giant earth-worm from South Gippsland, a hung-fish from Queensland, Victorian fresh water fishes, trapdoor spiders, ants, etc.

OBSERVATIONS ON THE LIFE HISTORY OF SAW-FLIES.

BY JANET W. RAFF, M.Sc., F.E.S.

The following notes represent life history data obtained from "captives" I have had from time to time, of the gregarious saw-fly larvae found feeding on leaves of Eucalypts.

As is well known, these larvae feed in masses, and when fully grown, burrow into the ground, spin cocoons of a parchment-like texture, and ultimately emerge as four-winged, stout-bodied "wasps." The female possesses a short, saw-like ovipositor, with which she cuts the leaf tissue during oviposition, and hence the insects are popularly called "saw-flies."

The larvae kept by me and followed out in the experiments as set out below, were apparently full-grown when collected. They were provided with leaves of the particular Eucalyptus on which they were found, and were kept on flower-pots filled with soil, and covered with either a wire gauze dish-cover, a glass bell-jar, or a lantern globe. The soil was made damp from time to time, and a watch was kept for the emergence of adults.

As will be seen below, in some cases, parasites were bred out, these belonging to the family of Flies known as Tachinidae. The existence of these parasites is of interest, since the saw-fly is one of the worst pests of our Eucalyptus trees; any form which, in nature, is helping to keep down their numbers, is of importance. It might be mentioned here, that one species of gum saw-fly in Queensland is recorded as a pest to cattle, these animals consuming large numbers of the larvae, often with fatal results.*

EXPERIMENT I.

Larvae collected at Warrandyte, Victoria, by Mr. G. F. Hill in October, 1928.

9/10/28. —Thirty-four larvae entered the soil for pupation.

Emergences;—

15/3/29.—One saw-fly (male).

8/4/29.—Five saw-flies (females).

29/8/29.—Five parasitic flies (Family Tachinidae).

13/9/29.—One parasitic fly (Family Tachinidae).

Total emergencies to date: —One male saw-fly, 5 female saw-flies, 6 Tachinids.

* See H. Tryon in *Queensland Agricultural Journal*, September, 1921, page 208.

EXPERIMENT 2.

Larvae collected at Wonga Park (South Warrandyte), Victoria, at a Field Naturalists' Club excursion, on October 13, 1928.
16/10/28.—Larvae entered soil for pupation.

Emergences:—

14/3/29.—One saw-fly (male).

14/3/29.—One saw-fly (female).

20/3/29.—Three saw-flies (females).

1/4/29.—Two saw-flies (females).

9/4/29.—One parasitic fly (Family Tachinidae).

Total emergences to date:—One male saw-fly, 6 female saw-flies,
1 Tachinid.

EXPERIMENT 3.

Larvae collected at Blackburn, Victoria, on October 19, 1928. These were divided into two lots—A and B.

Lot A.—Eleven larvae.

28/10/28.—Larvae entered soil for pupation.

Emergences:—

31/3/29.—Three saw-flies (females).

5/4/29.—One saw-fly (female).

8/4/29.—Three saw-flies (females).

10/4/29.—Two saw-flies (females).

Total emergences to date.—Nine female saw-flies.

Lot B.—Eight larvae.

31/10/28.—Larvae entered the soil for pupation.

Emergences:—

30/3/29.—One saw-fly (female).

5/4/29.—Two saw-flies (females).

8/4/29.—Four saw-flies (females).

Total emergences to date.—Seven female saw-flies.

EXPERIMENT 4.

Larvae collected at Eltham, Victoria, on September 14, 1929.

11/10/29.—Sixteen larvae entered soil for pupation.

Emergences:—

12/12/29.—Five Tachinid flies.

13/12/29.—One Tachinid fly.

14/12/29.—One Tachinid fly.

16/12/29.—One Tachinid fly.

18/2/30.—One Tachinid fly found dead; actual date of emergence not known.

Total emergences to date:—Nine Tachinid flies.

From these experiments, all of which I still have under observation at the University School of Agriculture and at my home, Kew, the following points may be noted:—

- (a) The depth to which the larvae burrowed into the soil for pupation varied between 3 and 4 inches.
- (b) The length of time spent in pupation was 5 months or more.
- (c) There was a great preponderance of females, which fact is of interest since it is known that parthenogenesis occurs freely in the family, unfertilised eggs giving rise to either males or females, or more rarely to both sexes.

From the emergences it was found that larvae of three species at least had been collected. In experiment 1, the species proved to be *Perga dorsalis*; experiments 2 and 3 yielded two different species of *Perga*, the names of which are not yet available. Mr. J. Clark, of the National Museum, has forwarded specimens to England for identification. Experiment 4 has, so far, yielded only parasites.

Larvae of all these forms were preserved, and I hope at a later date to describe them in detail.

"SPARE THAT TREE!"

Ku-ring-gai Municipal Council, New South Wales, has issued a leaflet urging citizens to "Spare that tree." The municipality, with its natural beauty and situation, is one of the most favoured districts around Sydney.

"Its picturesqueness and health (the leaflet is quoted) are largely due to its native trees. It is becoming famous because of the devotion of its residents to their trees and gardens. It is adopting a new Commandment—'Thou shalt preserve those trees.'

"Think twice before you cut down a tree or shrub—especially if it be an Australian native. If removal be unavoidable, take a leaf from the law of the Frenchman and plant two trees where one grew before." The little Jap. regards a beautiful tree as national property—copy him and look upon your trees with civic pride."

IN DEFENCE OF THE EAGLE.

Writing to the president (Mr. P. R. H. St. John), from Glenorchy, Mr. A. W. W. Collum says that he also has no sympathy with attacks made on the Wedge-tail Eagle. "I have been farming in the Wimmera for over 50 years, and within 20 miles of the Grampians, the home of the Eagle, and, moved by observations, have defended it against the 'sins' laid to its charge. It is more beneficial than the reverse. I think this can be said of most members of the family. The most malevolent of all birds to the sheep farmer is the Crow, but, unfortunately, it has developed an intelligence which protects it from extermination. But the Eagle, being slow and apparently not of high intelligence, makes an easy target for an indifferent marksman. A sheep farmer once told me that he was watching an Eagle perched in a tree among his sheep and lambs. It carried away a rabbit!"

STUDY OF AUSTRALIAN THRIPS.

The *Victorian Naturalist* penetrates into all civilised countries and it is interesting to note that scientific societies of most aristocratic standing welcome papers that appear in our Club journal for ideas on which their eminent members found their researches. The Entomological Society of London has availed itself of the articles by Mrs. E. Coleman and published her observations on orchid fertilisation, with elaborate illustrations. In a recent pamphlet, Professor Poulton, of Oxford, has again referred to this lady's observations on mimicry and fertilisation.

The latest compliment to our journal and its contributors is an article by Dr. Bagnall, published in the December *Transactions* of the above Society, on the Thrips frequenting or inhabiting the glands of acacia leaves and phyllodes. This article is founded on a paper by Mr. A. D. Hardy on "The Distribution of Leaf Glands in Some Victorian Acacias" (*Victorian Naturalist*, XXIX., p. 26, June, 1912), and mainly on the paper by Mr. Reginald Kelly on "Observations on the Function of Acacia Leaf Glands" (*Victorian Naturalist*, XXX., pp. 121-127), which paper Dr. Bagnall quotes almost in extenso.

Dr. Bagnall, who is a leading authority on Thysanoptera, describes several minute species of the suborder Tubulifera (which, he is of opinion, frequent these glands), and establishes two new genera for the group *Rhopaloides* in which he includes *R. brunneus*, *R. Kellyanus* and *R. froggatti*, and *Froggattothrips*, in which are *F. acaciae* and *F. inconsequens*. Bagnall shows their relationship to American genera, found mainly on *Opuntia* (prickly pear). He surmises that on this xerophilous plant there are probably similar glands to those on our Australian acacias.

The study of Thrips is still in its early stages, notwithstanding that since the study of this order was undertaken by Mr. Kelly, in 1914, over 200 species have been discovered. It is interesting to know that, in addition to the discovery of new species and the systematic arrangements of same, Mr. Kelly has himself described several new species, and is concentrating on the phylogeny of the order and studying its parthenogenetic and alternative sexual breeding. This should have a radical effect in suppression of the pest.

Specialists at the Waite Institute in South Australia also are studying the genus *Franklinella* and the destructive common species *Thrips imaginis* (which, through Mr. Kelly's research in conjunction with Dr. Bagnall, is now distinguished from the European species *T. tabaci*), and endeavouring to establish whether the native species, *T. imaginis*, is the cause of tomato wilt.

THE GREEN TREE-SNAKE.

Many of the Australian snakes are attractive, at least to those who are without prejudice against reptiles, but none is more desirable as a pet than the Green Tree-snake, *Dendrophis punctulatus* Gray. Slim it is and beautiful in coloration, bright green on the upper portion of the body, with a patterning, on the skin, in black and white, and rich yellow below. It glides among the foliage like an undulating tube of tinted glass, and upon the ground is quite as agile.

Though the species may attain a length of 6 feet, smaller size is the rule; many I have seen were not over 4 feet. Recently a fine specimen was sent to me from Bulladelah, New South Wales, by Dr. H. L. Kesteven. This welcome addition to my "happy family" of pets had made a long railway journey coiled in a tin, but arrived in perfect condition. The moment the lid was lifted, *Dendrophis* raised its shapely head, which is distinct from the neck, and flickered its tongue vigorously. Far from showing fear, the snake eyed me keenly, and was ready for an offensive when a hand hovered near its head.

Tree-snakes are difficult to capture in their haunts, nor are they readily discovered since their colours harmonise well with the foliage of trees and shrubs, or the slender body may be mistaken for a length of swaying creeper. The late Mrs. Ellis Rowan, when flower hunting in North Queensland, was deceived once by this camouflage. A tree-snake, pendant from a bough directly above the artist, touched her with its head and was brushed aside as an annoying creeper! A second time this happened, when Mrs. Rowan was startled to find that the persistent "creeper" was a snake!—doubtless *D. calligaster*, the Northern Green Tree-snake, which, of course, like its southern ally, is non-venomous.

Small birds and, perhaps to a much lesser extent, small mammals, are preyed upon by tree-snakes. Among the orange orchards on northern rivers of New South Wales, the Green Tree-snake, I believe, is not uncommon; it is certainly plentiful in the coastal brushies. An observant orchardist told me that he had no mercy on these reptiles, because they took heavy toll of his bird friends. Many nests in his fruit trees had been raided.

Sometimes one meets with tree-snakes among the ferns in swampy places, and I once found two coiled in a hollow stump. But they are well named, being essentially of arboreal habits. "For climbing," writes Mr. J. R. Kinghorn (in his excellent book *Snakes of Australia*). "tree-snakes have a special adaptation

in the form of a sharp keel or notch on each side of the ventral plates."

The Green Tree-snake may become popular as a pet. Only it means trouble to keep one in comfort. These very agile reptiles are impatient of confinement in close quarters. I placed my *Dendrophis* in a large bath-tub, out in the yard, for a sun bath. Soon it was "over the top," and a chase was followed by a long search in the wild flower plot. A glasshouse might be suitable as a home for tree-snakes, unless, like me, you delight in having little frogs among your ferns. Tree-snakes also have a liking for frogs!

C. BARRETT.

EXCURSION TO SEAHOLM.

Fourteen members attended this excursion on January 18. Through the unavoidable absence of Mr. A. C. Nilson, Mr. A. E. Rodda acted as leader.

The weather was fine, but a strong south-west wind made conditions on the beach rather uncomfortable. A high tide frustrated our main object of examining the shore life, which, in this locality, is abundant and interesting on the extensive flats. For the same reason, a close approach to the fringe of White Mangroves on the southern bank of the Kororoit Creek was prevented. These small trees were once abundant around the mouth of the Yarra, but those on the creek now remain the nearest to the city.

Our first find was the nest of a Dotterel, a clutch of two pear-shaped, speckled eggs, in a slight depression of the bare ground. As no birds were seen in the vicinity, the species was not determined. Some time was spent in examining the littoral flora on the marshy flat behind the raccourse. The Glasswort (*Arthrocnemum*) here grows into large bushes up to 3 feet in height, and in them some old Chats' nest were found. In places large patches of the Rounded Pigface covered the ground with a variegated carpet in shades of green, yellow and red. The Prickly Saltwort, Seablite, Coastal Saltbush, and Sea Heath were noted, and on the beach the introduced Florned Poppy and African Box-thorn were growing.

A few dead shells, of which the most striking were *Phasianella* and *Chamastra*, were found, and numerous Echinoids. The peculiar dentition of the latter was demonstrated by Mr. A. L. Scott. Bird life, usually very interesting in this locality, was scarce, excepting that Silver Gulls abounded. We also disturbed a flight of about a dozen Spur-winged Plover. With the gulls were a few Sea Curlew. Half a mile out at sea about 30 Black Swans were seen, a very small flock compared with the numbers usually seen here. Other birds noted were the Pacific Gull, Black Cormorant, Dotterell sp., White-fronted Chat, and the European Skylark.

Under more favourable conditions, and with the assistance of some of our botanists, this corner of the bay and the district around Altona should prove a profitable area for a whole day excursion.

A.E.R.

THE PIONEERS.

BY TARLTON RAYMENT.

A kinsman, touched with the fever that is induced by gold, and feeling the wander spirit strong within him, saddled his horse, slung his packs over the spare animals, and turned his face to the south, and the range of mountains that cuts Victoria in half.

Up and down he went; the Strzelecki ranges proving a formidable harrier. True, no great heights had to be scaled, but the impenetrable botanical world defied his efforts to progress. The immensity of the trees! The huge silvery boles of the "white" gums made a continuous colonnade, while the gray trunks of the "blue" gums supplied the contrast of columns in the shade; here and there the dark umber of the stringybarks and the messmates gave the necessary relief in colour and a rougher texture.

The Eucalyptus giants were the tallest screen, and beneath them was yet another level created by the thick, dark foliage of the Blackwoods, the yellowish tints of the Pittosporums, the silvery lines of the Wattles, the Musk and the Hazel. There were other levels at varying heights; the slender tree-ferns with the Supplejacks twining and draping themselves. At lower depths the dense Tea-tree and the "prickly Moses" effectively stopped all progress. But the undergrowth went lower still. At three and four feet the Coast-hop, and the Bottlebrushes managed to survive, and on the forest floor the maidenhair and the cathead ferns trembled in among the long hooked vines of the wild-raspberry.

Surely no other place could be more heavily decked with life! With his axe my kinsman chopped and slashed his way into the mighty province of South Gippsland. Finding a few "Australian rubies" in a creek, he unstrapped his packs, and catching sufficient of the large native black fish for his supper, he settled down on the banks of the stream, which is called "The Ruby Creek." A tree yielded him the timber for his house, and the fencing for his paddock.

I went later, when huge squares of the original maze had fallen to the labours of the settlers. Large fish were in the creek. Bush fires ravaged many a mile, but much of the virgin bush was still standing in its pride. Did I find many Apidae in that prolific growth? Surely that wealth of forest meant an abundance of nectar for the bees! The sweet, cloying scent of the Pittosporums must have attracted the honey-gatherers in untold myriads!

It was a forest that awed one with its dominating ubiquity. I feel I have been specially privileged to behold it, otherwise I

never would have believed that any land could nourish such a verdure. But the simple life of that country had its attractions—and serious disabilities. The science of the bush was very primitive.

I remember the homely teas brewed from curious plants such as the bark of the Sassafras, the most popular medicine being a kind of native watercress rejoicing in the euphonious name of "brook-line." This was gathered when in bloom, the plants were boiled, and the water evaporated down until a strong infusion was secured. Whatever virtues it possessed did not outweigh the offensive odour during the cooking, but it was regarded as sovereign remedy for all ills.

One of the disadvantages was the "post office box," which nestled in a hollow tree, and was visited at any convenient period. When John Jones received a bill—long overdue—it was often in the box for a week or more before he called. All knew of his and the others debts, but few in that young country were without those incommoding "encumbrances on progress."

Of wild bees there was none, though the introduced *Apis* was numerous. Certainly, I could not examine closely the scanty tufts of foliage that crowned the giants' small heads towering up 300 feet or more, but I have seen many trees fallen in the middle of their blooming, and wild bees were always absent from such feasts.

The axe, the saw and the flame cleared the richest of the soil, and on those parts the seed of English grasses was sown to provide a pasture for the stock that now came in to take possession of the land. A raw civilisation was in command, and, among the lesser followers, were the Thistles, the Flat-weed and the Dandelions from the old, old, overcrowded world.

Wherever these plants penetrate the bush there one will find the insect pioneers, the advance guards, as it were, of the honey-gatherers. In much of South Gippsland the naturalist will go for days, in summer, and see but a bee or two, but where the Flat-weed is abundant he will always be rewarded with two or three tiny pioneers, *H. lanarius*, *H. subinclmans* and *H. lanariellus*. These I regard as the early settlers, the forerunners of the bee races. On the southern coast line, there are numerous species of the genera *Paracolletes*, *Parasphcodes* and *Exoneura*, but these *Halicti* are the first to "follow the flag."

Halictus lanarius has a broad view of life and is at home on many kinds of plants. I find her laden with creamy pollen from the introduced *Veronica*, and the native gum trees, and Mrs. Coleman, who studies the orchids, finds this *Halictus* on those blooms.

Though the habitat of *H. lanarius* Smith is the States of the Commonwealth, yet no one has described her nest. Permit me to fill the vacancy. It is a rude shaft in the ground, without lining of any kind, and the diameter is about 4 mm. There are egg-shaped cells at varying levels, and they, too, are devoid of lining. The puddings are regular spheres, and are formed of pollen moistened on the outside with honey, the inside being almost dry; it conforms in every way to the specification written by Fabre.

What of the generations, I find females from August to April, and there are males in abundance during Christmas time. It seems to me that the generations of *H. lanarius* are similar to those of the French species described by Fabre. There are two broods, exclusively females, and the third generation is a mixed one of males and females, say, half a dozen or so of each.

I have not checked up all the details of the biology of this *Halictus*, for I have now no further opportunity to do so, but she is ubiquitous and I leave the further details of her story for others to unravel. I am satisfied to record the pioneering spirit that urges her to go forward into the little clearings of the settler, to pave the way for the weaker members of the race.

AN UNFAMILIAR FERN.

There are few Victorian records of *Polytichum* (*Aspidium*) *hispidum*, the Hairy Shield Fern, though it grows abundantly where it has been located. It is one of our rarer species, unfamiliar even to many botanists, as a wild plant. Nor is it common in cultivation.

Recently, in a gully near the head of the Bunyip River, Mr. R. W. Howling, of Malvern, discovered a fine "colony" of *P. hispidum*. It grows on mossy stones along the waterside, and on tree-fern trunks, luxuriantly. Mr. H. B. Williamson collected the species on the Johanna River, near Crowes; Mr. P. R. H. St. John found it at Healesville, about thirty years ago. There are no very recent records, and the Victorian specimens of the Hairy Shield Fern in the National Herbarium are from only a few localities.

This is a charming fern—but are not all ferns attractive? It thrives in cultivation, and the fronds, especially young ones, present a variety of beautiful colour shades, from golden brown to rich bronze-green. They measure up to about two feet in length. The stems and the mid-ribs of the fronds are covered in dark brown hairs, fine and long. *P. hispidum* occurs in New South Wales and Tasmania; in New Zealand it is the commonest member of its genus, from sea level to 2000 feet. "This species is so plentiful in lowland bush," writes Mr. H. Dobbie (*New Zealand Ferns*, p. 296). "that it often covers the ground far and wide with a mat of feathery fronds. . . . I have encountered it festooning the stem of a tree-fern with handsome fronds over two feet long, the under side heavy with an abundant crop of seed. . . . Found also in Victoria, where it is rare and local."

C. BARRETT.

EXCURSION TO FLINDERS.

The excursion to Flinders, January 20, 27, was attended by twelve members and friends. Weather conditions were perfect, and the trip was most interesting, especially to those geologically inclined. Proceeding by car on the Sunday to Simmonds Bay, several miles west of Flinders, the party examined the very fine coastal sections of the older volcanic series of this area. A number of distinct and separate lava flows have been poured out during middle Tertiary times, filling in a very broad valley. They are separated by clay, which has in all probability resulted from the decomposition of the more vesicular parts of the flows or of associated tufts.

Some of the interesting zeolites and other secondary minerals were noted, and many fine examples collected. The effects of atmospheric agencies in the weathering and decomposition of Basalt, of chemical action and the formation of these zeolites, and many coloured clays are seen to advantage. Marine erosion has given rise to very fine and rugged coastal scenery, with cliffs rising to a height of several hundred feet from sea level. Rock platforms are most extensive, and show especially during rough weather, when the white foams marks their seaward limit, often hundreds of yards from the base of the cliffs.

On the Monday the party visited the limestone deposit close to Flinders. Here a limestone of Miocene age, mostly made up of bryozoal fragments, rests on the eroded and irregular surface of the older basalt. Remains of a basalt shingle is still to be seen between the formations. Many fossils were collected, mostly Calcareous, Echinoid spines and Foraminifera. This limestone indicates that this area was submerged for long periods after its formation, and would largely account for the wonderful preservation of these volcanic rocks over such a large portion of the Mornington Peninsula.

S. R. MITCHELL.

Flora and Fauna. The motor trip from Frankston to Flinders reveals, on account of the varying nature of the country, many diverse types of vegetation. The hilly country behind Frankston is timbered with somewhat stunted Eucalypts, among which can be glimpsed, as the vehicle speeds along, *Casuarinas*, small *Banksias*, Cherry ballart, and *Casuarinas*. The shallow pul-lies generally contain tall growth of the Scented Paper-barks, and where the ground is flat and damp the Swamp Paper-barks grow densely. At Hastings the head of a shallow inlet of Westernport Bay is covered by the White Mangrove and salsolaceous vegetation.

At Flinders, much of the natural vegetation has been cleared off, but the old sand dunes overlying the basalt, are thickly covered with the characteristic vegetation of the eastern side of Port Phillip Bay. This is particularly noticeable on West Head, a very high and prominent headland which practically divides the calm waters of the Bay from the turbulent surges of Bass Strait, and which has been very wisely reserved as a public park. At Simmonds Bay, fronting the Strait, the high basaltic cliffs do not offer much foothold to plants, but the silvery Cushion-bush persists high up on the rock faces. Here, where a trickle of mineralised water oozes through the basalt, a dense growth of the Creeping Brookweed, with its delicate pink flowers caught the eye. The talus slopes are thickly covered with *Tetragonia*, which affords sustenance and shelter to many rabbits.

On the ocean beach we found a bunch of Ship Barnacles, still alive, attached to the fringing trend of a large Kelp-weed. By the size of these crustaceans, their "ship" had been afloat for a considerable time. A large living specimen of the Elephant-shell mollusc was also found and allowed to creep about in a small tidal pool. Red and brown Sea Anemones were very numerous in the rock pools and readily accepted crushed shellfish offered to them. A Seal, from the adjacent Seal Rocks, was seen close inshore.

Birds were not at all plentiful. In the trees around Flinders House, a small flock of Grey-crowned Babblers, with attendant Noisy Miners, were in evidence each day of our stay, and a few Rosellas were seen. At the seaside, the two species of Gulls and Terns, Gannets, and a pair of Kestrels were noted.

A. E. R. ROODA.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday, March 10, 1930. The president, Mr. P. R. H. St. John, occupied the chair, and there were about 130 members and visitors present.

CORRESPONDENCE.

From the Wild Life Preservation Society of Australia, thanking the Club for its assistance in the Society's efforts to preserve the Thylacine, and stating that, as a result, the Minister for Customs had since prohibited the export from Tasmania of the animal, its skin, or skeleton.

From the Royal Horticultural Society of Victoria, inviting Club members to an excursion at the Burnley Gardens on March 22.

From the Government Tourist Bureau, drawing attention to railway excursions to Yallourn and Ballarat on March 24.

REPORTS.

A report on the excursion to Sandringham on March 8 was given by Mr. F. G. A. Barnard, in the absence of the leader, Mr. Tarlton Rayment.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As ordinary members: Mr. and Mrs. L. W. Cooper, Hawthorn, and as associate member, Miss A. W. Kenyon, Toorak.

GENERAL.

Mr. G. Coghill reported on the deputation to the Minister for Forests regarding the Cumberland Valley reservation, and said that he felt sure that the requests would receive favourable consideration. Mr. E. E. Pescott, F.L.S., outlined the proposals to date, for the celebration of the Club's jubilee in June next, and asked for the earnest assistance of members.

NATURE NOTES.

Brief notes were contributed by Mr. A. S. Kenyon regarding the growth of the Mulga Acacia and other vegetation in Central Australia after good rains, and by Mr. L. L. Hodgson on methods of nest-building of the Sacred Kingfisher.

LECTURETTES.

The subject for the evening being "Ferns," Mr. H. B. Williamson spoke on the sexual and asexual generations and explained the methods of classification. His talk was illustrated by drawings, a classification key, and specimens.

Mr. P. R. H. St. John followed, dealing with variations in species, propagation and cultivation, and soils suitable for Ferns of the various genera.

EXHIBITS.

By Miss B. Bolton.—Fern *Cheilanthes Sieberi*, collected : St. Helena, Victoria.

By Mr. A. E. Rodda.—(a) Growing plant of Nardoo, *Marsilia Drummondii*, from Altona; (b) For Master W. Ellis: Emerged legless and wingless female and pupa case of Lictor Case Moth, from a Melbourne garden.

By Mrs. W. Hanks.—Marine shells collected at Mallacoota Inlet.

By Miss J. W. Raff.—Three forms of Gum Saw-flies (*Perga* spp.) bred from larvae; also specimens of larva, cocoons and parasite, illustrating exhibitor's notes in March *Naturalist*.

By Mr. E. E. Pescott.—Giant Maidenhair Fern (Black-stem Maidenhair), *Adiantum formosum*, R.Br., native to East Gippsland, grown by exhibitor.

By Mr. C. French, junr.—Ferns in pots—*Pellaea falcata* Sickle Fern, and *Todea barbara* King Fern.

By Mr. C. Barrett.—*Polystichum hispidum*, Hairy Shield-Fern, and *Tmesipteris tannensis*, Fern Clubmoss, from Bunyip River, Beenak.

By Mr. F. G. A. Barnard.—The Rasp Ferns *Doodia caudata* and *D. aspera*, native to Victoria.

By Mr. H. B. Williamson.—Dried specimens and diagrams to illustrate Fern classification and micro, slides showing Fern spores and young Fern plant.

By Mr. F. Pitcher.—(a) Living plants of *Platynerium Hillii*, Hill's Elk-horn Fern, *Blechnum penna-marina* Alpine Fern, *Dryopteris decomposita* Shiny Shield Fern, *Todea barbara* King Fern (young); (b) Cut fronds from *Pteris umbrosa* Shade Brake Fern, *Pellaea falcata* Sickle Fern, *Polystichum aculeatum*, Common Shield Fern, with young plants developing on fronds; (c) Dried specimens of *Schizaea bifida*, *Botrychium australe*, *Blechnum lanceolatum*, *B. fluviatile*, *Gymnogramme decomposita*, Gold Fern of South America, and *Cyathea dealbata*, Silver Tree Fern of New Zealand.

By Melbourne Botanic Gardens, per Mr. P. R. H. St. John.—Twenty-one dried specimens of rare Ferns and flowering specimens of *Leptospermum scoparium*, Forster var *grandiflorum roseum* of New South Wales.

By Mr. C. J. Gabriel.—A series of the Victorian Mutton-fish shells, *Halotis naevosa* Martyn, showing stages of growth.

MOUNT NELSON AND ITS SURROUNDINGS.

BY ALFRED J. TADGELL.

To those who do not know the Alpine regions of the north-east of Victoria, Mount Nelson will be only a name. Yet, as one looks from the approaches of Mt. Fainter, a huge bulk, 9 miles distant, blots out the skyline and horizon, even to the exclusion of Mt. Kosciusko, highest of Australian mountains, and the nearer Mounts Pilot and the Cobberas. The latter two are almost as high as Nelson itself, which is 6170 feet above sea level, the third highest mountain in Victoria.

The name Nelson appears on our old Victorian maps, and is corrupted by some to "Nelse," for which, the Lands Department states, there is no foundation whatever. And current legend is exploded when we are informed that there never was anyone named Nelse who had a "run" near the district. Stockmen who use the country around have a boy-like habit of shortening names, for not only do they use Nelse for Nelson, but the euphonious Mt. Flora is wrongly called Jim. Mt. Cope, to them, is Jack, and the prettily sounding Bundarra they know as the river Bundah. The mountains are in the same neighbourhood, but appear hill-like in the surrounding country, whereas they are some 6000 feet high.

Nelson vies with Mt. Bogong itself in bulk, is 3 miles long and at least half a mile wide; treeless on its exposed summit, and continued from almost Holland's Knob, round which the snow poles wind, towards Fitzgerald's hut and the "Park." It extends to the rocky sided Spion Kop and Tim's Lookout, and may be said to include the mass called Grey Mount also. Its more sheltered snow-gum slopes are almost trackless, and one requires to dismount when he reaches the rugged slopes of Spion Kop. On the opposite side of Nelson, facing the wide valley of the Big River that later becomes the Mitta Mitta, is the great mass called Bogong, the highest mountain in Victoria, while under Nelson, along the river, sheltered at 4000 feet, runs the old mining pack track to Mt. Wills, once an Eldorado but now of the past. One can pass by way of Mt. Bogong from a continuing spur till Mt. Wills is reached, but few know, or care to dare, the difficult means of access—some 8 miles—connecting Mts. Nelson and Bogong. And while horsemen essay the journey, the few walkers who have tried it regard it as very rough and fatiguing, notwithstanding the beautiful stream that flows below, and its angling possibilities.

The valleys separating Nelson from Bogong and Wills are appalling in their depths and ruggedness, and perhaps stockmen,

at mustering only, explore their fastness. They do so and one takes off one's hat to the stockmen of these parts. There was, until recently, a hut called Duane's, situated on the northern slope of Nelson beyond Tim's Lookout, on the Big River fall facing Bogong; but this hut and our old friend the log hut on Mt. Bogong were both destroyed by bush fires (described in the *Naturalist*, June, 1926). To many it will be a pleasure to know that a new hut has been erected on Bogong, nearer Howman's Falls and about a mile east of its old location. There is a great desire on the part of stockmen and the members of the Ski Club to rebuild near the site of Duane's destroyed hut, but some difficulty is being experienced in obtaining permission. It is an ideal situation, would command magnificent views, and field naturalists would be but rarely disturbed. A neat hut has recently been erected, by Mr. Johnstone, on Paradise Creek, under the exposed southerly end of Mt. Nelson, and can be readily seen from the end of the mountain, situated about three-quarters of a mile distant and forming a triangle with Holland's Knob. Another new structure is the best-equipped hut on the plains, 30 ft. x 15 ft., protected by a sloping hill three-quarters of a mile from Mt. Cope on the Nelson side at the head of Middle Creek, and commanding beautiful views.

Tourists are grateful for the many huts scattered over these parts beyond civilisation, and one would impress on thoughtless travellers that carving and writing names does not add to the delight and abandonment experienced in these boundless, spacious realms. Someone, we noticed, had indignantly written over the names in a hut "For asses to ponder over." Even in the Mt. Cope hut, in bold, large letters, are written names extending over both screens. One should not, as a visitor, perhaps be critical, but might venture to suggest to those erecting the huts—if public bodies—that perhaps the entrance and porch be on the unexposed or eastern, and not on the weather side—the south or west.

There are several ways of reaching Mt. Nelson. One is from the Omeo or Glen Wills side, via Fitzgerald's along the snow pole track, passing close to Nelson and leaving it and Mr. Johnstone's hut, on the right. Another way is from Mt. Hotham, passing Mt. Loch, dipping into the Cobungra River at Dibbin's hut at practically the only elevation connecting the High Plains and the spurs falling away from Hotham, on one side of which rises the Cobungra, and scarcely half a mile distant, on the other, a branch of the Kiewa. So that, standing off on the Plains, one does not realise that there are two distinct head-waters so close together. The snow pole line passes Dibbin's and branches off quite near to Young's hut, but continuing, it reaches to Mt. Flora, or Jim, where it junctions with the pole line that comes over

Fainter past the Tawonga hut, and that again, under Mt. Feather-top close to the Kiewa River known as Dungey's track, and past the Tarn up to the Plains.

All these lines of snow poles converge at Mt. Flora, continue on to the turn at Mt. Nelson, going on to Fitzgerald's hut, 3 miles beyond. A more direct route from Tawonga can be made without passing over Mt. Fainter, for near Mt. Beauty about 3 miles on the way to Fainter, close to a large, white-barked Eucalyptus with intergrowing branches, one finds a good, but rough track to Roper's hut and beyond, till it comes out in the Rocky Valley within sight of the snow poles passing Mt. Nelson. Near where the track comes out is the site of one of the self-recording current gauges in the river and the Electricity Commission's camp, where boring is being conducted to find suitable bedrock for the immense walls to hold back the water in the great dam or lake that will once have been the Rocky Valley. Close to this camp our horses and dogs disturbed a flock of 6 emus—*Dromaius*—that hastily made up the steep hill slope.

The camp in Rocky Valley is about $2\frac{1}{2}$ miles from Mt. Nelson, whose approaches we found dry, and we appeared to make slow progress to the summit. Several times we thought the rounded crest had been reached, and, to avoid deep and wide depressions, we had to turn our horses towards the heads of the valleys in crossing the intervening spaces. Indeed, the slopes, as well as Mt. Nelson range itself, were found less interesting botanically than we expected, though the several gorges were alluring. The mount is composed of gneiss formation with many white quartz outcrops, and was a fair sample of the difference experienced from the basaltic with its black or chocolate soil, much of which is peaty in the valleys and well grassed and botanically very interesting.

On the bleak southern slopes *Kunzea*, *Grevillea*, *Orites*, *Pentstemon* lay flattened on the rocks, sheltered from the wind and warmed by the sun. The Silver Daisy was flowerless, with harsh leaves. In the moister places *Epacris petrophila* was seen with occasional *E. bambawiensis*, but both were nearly over for the season. There was more *Euphrasia antarctica* than we had seen elsewhere and less *E. collina*. The rarest grass was *Agropyrum velutinum*, which we found in two other portions of the plains only.

From Mt. Nelson the panoramic outlook is very extensive. Turning one's back to the bulky Mts. Bogong and Wills, north and east nearby, one sees on the distant skyline the serrated Buffaloes, the mecca of so many tourists, and the cloud-like bluff of Cobbler, round to the Twins, while Mts. Loch and Hotham are an

indéfinable and apparently joined mass. Other great mountain billows loom in the south-west. Feathertop is 15 miles distant and Fainter a little nearer, with other granite and quartz masses up to 6000 feet, as yet unnamed, but appearing strangely different from the angle of our viewpoint. In between are the High Plains, 9 miles away, the Pretty Valley, 6 miles, and the Rocky Valley, 3 miles. It is a boundless and expansive view. One tries in imagination to picture the immense depressions in front of him, when seen later they will be full of dammed water in summer and a thick ice sheet in winter.

In prospect are seen Alpine sports and the busy throngs of tourists coming from not only all parts of Australia, but beyond, to its roof. Aerodromes and runaways must in a few years be part of the scheme, as these Alps will be only two hours by plane—not two long days, as at present—from our great capital city. What a sanctuary these vast expanses of water will be for innumerable waterfowl, and a future generation or two, looking backward, will wonder how their ancestors existed without it. Will advancing science not cause these vast highlands to become more useful, as to provide late fruits and whatnots long after the lower lands will have had their crops garnered? Australia cannot always remain a place of vast spaces, desert and alpine, and the high power generated by this great electricity scheme will produce, here and elsewhere, many revolutions in living conditions.

In the Pretty Valley, at 5600 feet, there are lagoons and some strangely fantastic watercourses, like Sanscrit writings. A branch of the Kiewa holds Galaxias of all sizes that flash through the mountain streams. Mr. J. A. Kershaw, to whom I submitted specimens, takes them to be the species *G. Findlayi*. Under the top of Mt. Fainter, at 5800 feet, a very cold spring bubbles forth. I took a number of crustaceans from its icy water, black, active "boatmen," as Mr. Maddison, our guide, calls them, and the more passive brown ones. Mr. Kershaw has kindly undertaken to forward some of them to Professor G. Nicholls, of Perth, with whom Mr. C. Barrett and I spent an enjoyable day in 1929, when the Professor was collecting in Victoria in connection with his monograph on freshwater crustaceans of Australia.

In the moist depressions of the great valleys luxuriant forms of *Pratia puberula* creep widely with *Ranunculus Millanii*, whose yellowish green flowers were a rare treat to us as they were so abundant. On the higher banks are similar coloured flowers of *Stackhousia pulvinaris*, rare and more difficult to collect for herbarium specimens, as the branches separate badly. The needle-like leaved rush *Oreobolus* bears insignificant flowers in the once-saturated places, and the golden *Callistemon Sieberi* is here found in swampy country. *Thelymitra venosa*, this year, is at

its best and is a rare sight of veined blue flowers in the sphagnum. Surely *Herpolirion novae-zealandiae* never grew more abundantly than here.

We collected two *Nitellas* growing submerged in the Pretty Valley lagoons. *Epilobium confertifolium* lines the damp banks thickly. It is compact and rarer than its sister, and has short, stalked flowers not so large as the more striking *E. glabellum*, hereabout so general, and when crowded, as one often finds them, exceedingly beautiful. *Microseris scapigera* has scapes 15 inches long. *Colobanthus* is almost everywhere in damp places. *Prostanthera cuneata* is a handsome shrub giving a rich floral display in many places. There is only one *Coprosma* in flower, the woody *C. nitida* that turns black when drying. An unusual attraction is a cushion formation of more than 100 closely-set plants of *Stylidium graminifolium*, dwarf, dense, and all within a radius of one foot square, reminding one, in its tuft-like nature, of its Crampians sister, *S. solumiferum*. Another cushion plant well distributed was *Ewartia*, with pretty, clear white, crisp flowers set against its grey-leadен leaves.

Eucalyptus coriacea var. *alpina* never looked so fine in flower. Almost everywhere the small brown *Xenicus* held revel, as they did two years ago, on damp flats among the *Baeckea*, now singularly without flowers. The frosted fruits and buds of *E. coriacea*, in the Alps, give it a distinguished appearance, and the strikingly-veined and glossy leaves make it attractive, the leaves having the appearance of being varnished. But this gloss does not protect the epidermis and render it exempt from its scale enemies. At 5330 feet the leaves are attacked by a scale formation that gives an open, blistered appearance where affected, and having rounded, small, brown egg-like galls attached inside. Mr. C. French, junr., tells me that this gall-making coccid (scale) is known as *Ascelis proemollis*. Several scales from same height and trees assumed the condition of violet ink splashes. What they are I have not been able to ascertain.

One must not associate always with 6000 feet altitude fogs and cold. Certainly if there be no wind, then prepare for fog; if the wind be from the south, then there is liability to snow, hail, frost and cold, rain even in February, but if the north wind blow, pleasant conditions may be depended upon. On this visit in January and February, 1930, we had prolonged pleasant warm days and nights, quite the reverse from conditions of two years ago, when Mr. F. E. Wilson was my companion. During this visit we dispensed with the second blanket, and at the Electricity Commission's camp in Rocky Valley, although in a breezy situation, Mr. Martin found the temperature on the night of the last

Wednesday in January the highest he had recorded, and he has been taking records for many years past.

Looking over to Spion Kop from Fainter, we see ample, though distant, silver streams sparkling in the sunlight, far beyond the slopes turned towards us. Naturally, in this broken country we look for waterfalls on some of the numerous creeks that issue from the mountain. And one does find, about half a mile or less from the crest, the White Rock Falls tumbling down the northern slope towards the Big River, between Spion Kop and Tim's Lookout. But by far the most imposing are the beautiful Paradise Falls on the eastern side, some 70 feet or 80 feet in height, well below the shepherd's hut of Mr. Johnstone, and not by any means easy of access. Indeed, one finds difficulty in climbing up on to Nelson from the east side and is not surprised to learn that the name "Tiger" is given to one spur by the locals, which aptly describes a difficult and lengthy approach.

The counting habit is something one must not encourage on top, for one finds oneself, on leaving Nelson's slopes, taking leave as of a departing friend and counting the number of snow poles to the turn towards Fitzgerald's, with so many more to the Ski Club's hut and on to Mt. Cope as one passes along the ridge that separates the waters that flow into Pretty and Rocky Valleys with their innumerable twists and turns, from those that run into the Cobungra or Bundarra Rivers. Close to the hurdle yards of Wallace's we found many specimens of *Stipa Muellieri*, a grass rare on the High Plains and recorded here for the first time for North-eastern Victoria. Keeping our eyes open we again found a flowering specimen of *Diuris pedunculata* at the great height, for this orchid, of 5800 feet. This *Diuris* does not seem too well at home in these exposed situations, and only in one other place, at 5300 feet, where Mr. Wilson and I got it two years ago, could I this year find flowering specimens, and then but twenty plants. This orchid was nearly past flowering and would find its best floral display in January. Regarding times of flowering of orchids in these parts, few *Caladenia alpina* are found in bloom in January after the first week; rarely *Prasophyllum Suttonii* on grassy slopes is seen till February, whereas the other leek orchid, here, *P. Tadgellianum*, almost everywhere, but preferring moisture, was flowering in hundreds in January.

On referring a large *Pterostylis* orchid to Dr. Rogers and Rev. H. M. R. Rupp, the latter was disposed to regard it as *P. furcata*, the former (with spirit and dried specimens) still has it under consideration. *P. furcata* is rare in Victoria. *P. cynnocephala* abundant, and *Gastrodia sesamoides*, collected in January 1928, at 5400 feet, could not be found again. A large group of *Chiloglottis Gunnii*, flowering profusely on the former

visit, had this time but one flower. We know the strange vagaries of orchids. In some of the swamps *Carex stellulata* (*echinata*) was abundant, and from some specimens I collected in January, 1928, from the same places, the Government Botanist of New South Wales identified the rare *Carex*, *C. rara*, which I then had unknowingly collected. This was at 5500 feet. A conspicuous grass we found in swampy country, was *Deschampsia* (*Aira*) *caespitosa*. It can hardly be overlooked as its laxly pendant, glossy panicles, attract attention and force the collector to notice it.

At Wallace's hut, circ. 5600 feet, a creek flat was investigated, but the only reward was the Bogong leek orchid in two forms and three colours, with a closely set in mud plant that I took for a varietal *Viola Sieberiana*, with unusual small but handsome indigo blue flowers, meekly turned downwards. At first sight it promised something rare. After examination of much material, I passed or collected it, not as a species, but as a variety. I must thank my friends of the National Herbarium, who have decided it is a mountain form of *Viola hederacea*—to me, a very beautiful form of this species. Midway between Wallace's and Mt. Cope, at 5560 feet is a moss-bed adjacent to the Ski Club's hut, where *Drosera Arcturi* was still flowering. One finds this peat-bed, never flowering profusely.

Lower down the sphagnum bed was *Restio australis*, in company with *Hypolaena lateriflora*, both in flower. Superficially, the *Restio* reminds us of its near relative, *Lepyrodia Muelleri*, but the ruddy brown *Restio* is very attractive. I regard it and the *Geum urbanum*, as rare on the High Plains, having found them both on this trip for the first time, the *Restio* at 5560 feet here and very local, the *Geum* at the Tarn, at 5300 feet and nowhere else. One might hurriedly pass the *Geum* for a giant stiff *Ranunculus lappaceus*, or a stray St. John's wort, but one is soon very interestedly examining the conspicuous yellow flowers of the *Geum*, with its bract-supported calyx and the numerous elbow-shaped styles.

Mt. Cope, 6027 feet, with a finely constructed cairn, is passed, and in the distance Campbell's stockyards are seen. The fossil bed on the left branch of the Bundarraah cannot be neglected, and under the fossil bank we collected numerous specimens of Caddisfly larvae, which infest the basalt stones in the running stream. When lifted out of the water the small creatures, in their cases, move with a snail-like motion over the stone. Here also we found the neat purple form of *Lagenophora stipitata* (*Billardieri*), a variety with very small flowers. A rather rare Victorian fossil fruit was taken out of the red bank here at 5360, a few feet above the basalt of the river bed. It has been examined by

Messrs. F. Chapman and R. A. Keble, palaeontologists, who tentatively refer it to *Cordia* of the family *Borraginaceae*, which has been found at Risdon, near Hobart, Tasmania, in the upper Tertiary beds. The genus *Cordia* has an indivisible drupe or stone fruit, and still flourishes in Australia in the Northern Territory.

Mt. Flora (Jim) brings us to where the snow pole line turns round towards Dibbin's and Young's huts and passes the bold "Rocky Bluff," nearly of the same elevation as Mt. Flora. From the Bluff runs one of the headwaters of the right branch of the Bundarra, which has yet to unite into one stream with its mate of the fossil bed, some miles below, through deep and rugged country and travelling down a wide valley of bleached Snow-gums as it heads eastwards to meet the Cobungra near its junction with the Mitta. Passing over rough basaltic country, by a narrow ridge towards Young's hut one notices on the left hand side at 5700 feet a snugly ensconced lake 300 yards by 100 yards, on whose surface and sanctuary rest peacefully a number of Black Duck, as yet unperturbed by the approach of the open shooting season. How glad we were, later, to learn of lean bags and less ruthless slaughter of innocents. This lake and the Tam towards the approach to Mt. Feathertop are the only natural lakes we know of on the High Plains. Although with the deviation of the snow poles one follows along to Young's hut, which is another port in a storm, it will not be found so comfortable or draught-proof on a cold night as Dibbin's, on the snow pole line to Mt. Hotham, so well situated, and with good water. One must retrace one's steps, as the track is not by way of Young's, to Baldy, the name Mt. Hotham is known by.

Standing on the High Plains with one's face towards Dibbin's hut and back to Mt. Flora, one traces the high Alpine road from Higginbotham Heights and the Chalet over Hotham's rounded and bare summit, which is above the tree line. In the intervening landscape is seen a network of picturesquely wooded slopes that form a beautiful prospect and whose countless number is at once a cause of awe and admiration. Yet one only of these numerous ridges that fall so steeply from Baldy leads over the Cobungra Gap on to the High Plains. By means of it the Electricity Commission's diamond drill was brought, by horse teams and sledges, to the Rocky Valley, where it is now working. These spurs are wild and rough journeying in the winter, but the Ski Club members sometimes reach the High Plains thus for their snow sports, though too often the exertion from Mt. Hotham to Dibbin's, with shoulder-pack of 60 lbs., is so strenuous as to

preclude further effort when this hut is reached. Many have gone no further, but have viewed their promised land from afar.

Hitherto our route from Melbourne has been by way of Wangaratta and Bright, thence by special car (or in earlier days, waggonette) over a high range to Tawonga. A daily return mail car now runs between Tawonga and Wodonga, so on our 1930 trip we made our railhead Wodonga. It was a delightful 60 miles' motoring, via Yackandandah and Dederang over Country Board's roads. The wide and fertile valley of the Kiewa, with the distant Bogongs in front of us and huge other mountain ranges of almost unpronounceable names on the flanks, made an inspiring journey. By permission of the Railway Department, one may make Bright or Wodonga a terminus or return by either route.

My thanks are, as usual, due to my friends of the Government Botanist's Department, and also to the several gentlemen mentioned in this account. My companion on my twelfth visit to the Australian Alps was Mr. T. Green, whose keenness in photography has led to his unique collection of orchid photographs being acquired by the Royal Botanic Gardens, Kew. On suggesting our outing for the day, Mr. Green, with artistic instinct, would invariably ask: "What shall we see?" This information I could not always readily supply, as, to me, in our Alps, "every prospect pleases." For, like E. A. Poe, "I love to regard the dark valleys, the grey rocks, the waters that silently smile, the forests that sigh, and the proud watchful mountains that look down upon all."

SPIDERS IN THE GARDEN.

"Leaf-curler" is a trivial name suggested for the spider *Araneus Wagneri*, so common in our gardens. Its den, a dead leaf twisted as one might curl a piece of paper about a finger, is moored by silken cables, and at a glance may seem to be unsupported—an autumn leaf stayed in falling. *Araneus* is alert, and captures many a fly and little moth deceived by the swaying brown leaf—perhaps attracted by it!

Eriata.—February *Naturalist*, p. 198, line 3, and March issue, p. 214, line 12, for *Julifera* read *Juliflorae*. Page 206, line 40, for protozoon, read polyzoon.

Copies of a leaflet, entitled *Botany and Its Economic Value*, by Mr. J. W. Audas, F.L.S., are obtainable from the author, free of charge, at the National Herbarium, Melbourne.

POLLINATION OF *CRYPTOSTYLIS ERECTA*, R.Br.
BY EDITH COLEMAN.

A short note on the pollination, in January, of the third New South Wales representative of the genus *Cryptostylis* appeared in the *Naturalist*, February, 1930. Further observations, made in February, fully confirm that note. Owing to the kindness of Mr. E. Nubling, of Sydney, I have been able to experiment with fresh specimens of *Cryptostylis erecta*, and have seen the pollen withdrawn from a number of flowers, as well as an interchange of insect visits to flowers of three species of the genus.

It came rather as a surprise to find that *C. erecta* is eagerly sought and pollinated by the males of the ichneumonid *Lissopimpla semipunctata*. From the extreme breadth of the labellum, as well as its concave shape, the co-operation of an insect under such circumstances is remarkable.

In this species, as well as the other three Australian species of the genus concerned in this strange method of pollination, the narrow petals and sepals are insignificant, the greatly modified labellum standing out as the most attractive part of the flower. The column is enclosed and partly hidden by the folded lower part of the labellum, and the projecting rostellum effectively prevents self-fertilisation.

The labellum extends into a broad concave lamina, too wide for its margins to be grasped by the legs of the visiting insect. Pale green in colour, it resembles a shell, with longitudinal stripes in reddish brown or purple. Down the centre is a membranous, vertical plate, and on each side of this ridge the red lines take the form of small red spots, or blotches, which correspond with the glands on the labellum of *C. leptochila*. Against the light these spots stand out very clearly on the semi-transparent labellum.

In the flowers examined the pollen masses were smaller than in our Victorian species, and probably less compact and more friable, but this may have been due to the age of my specimens. *C. erecta* is the only species in which I have seen the removal of only one pollen mass. In the other species the insect withdraws the whole pollinarium, which includes the viscid disc.

There is certainly some suggestion of mimetic modification, but everything points to scent as the chief attraction for the insects, a scent so subtle as to elude human perception.

In January I exposed flowers of *C. erecta* alone, so that the bulk of perfume from the few flowers must have been very slight. The insects at that time were not numerous, and it was some days before I witnessed the removal of the pollen. In late February, on several sultry days, the flowers were visited freely.

Plate XL.



Lissopimpla scirpunctata, with three complete pollinaria withdrawn from three flowers of *Cryptostylis subulata*, in rapid succession. Portion of one pollinarium is at the back, and, therefore, not visible. (Greatly enlarged)

On one occasion the insects were so persistent that I begged assistance to prevent the loss of all the pollen from the few remaining flowers, for they quickly fade when once the pollen is removed.

On another occasion I covered with butter muslin the flowers I did not wish to be visited, leaving only one raceme above the muslin. Many attempts were made by the insects to reach the protected flowers.

With undoubted evidence that four Australian species of *Cryptostylis* are pollinated by the same species of insect, the question of hybrids again crops up.

In the case of the single isolated representatives in West and South Australia these are unlikely to be crossed with the other distant species. But in Victoria and New South Wales the matter is more surprising. The two Victorian species are found growing intermingled, and the three New South Wales species are not very distant. My present view is that the absence of hybrids may be due to the fact that anther and stigma in various species mature at different periods, and that pollen from one species is incapable of fertilising another; but it is possible that further observation may compel modification of this view.

There is a marked difference in the size of the pollen grains, as well as the pollen-masses, of the various species. It is probable that the pollen tubes may vary correspondingly, and that the tubes of one species may be too large to enter the micropyles of the ovules in another. Under these conditions pollination would fail to effect fertilisation. On the other hand, there are probably instances where the pollen tubes are smaller than the micropyles and in these circumstances one might confidently expect fertilisation to take place.

A possible explanation may be found in the fact that we have hybrids which have inherited only the characteristics of the mother flower, and, bearing no trace of the flower which produced the fertilising pollen, are therefore unrecognisable as hybrids.

Instances are on record of species having been crossed which resulted in fertilisation, but all the offspring have resembled the mother plant, even to four generations of repeated crossing, and show no trace of the pollen-bearing species. At the present time I am experimenting with pollen from the different species of *Cryptostylis*, but am not yet able to write with any authority on its germination.

One would like to know something more concerning the habits of this special ichneumonid. This season there were very few about the garden until February. This may have been due to the delayed rainfall. In a not very wide experience of insects I find that, in cases of those species which undergo metamorphosis many emerge after a shower of rain.

The dry season may have delayed the appearance of the ichneumon-flies. It is certainly so within my insect cages. I find emergence considerably hastened if a moist sponge, or pad of blotting paper, be kept in the jars.

With the evidence before us on this method of pollination of our Australian species of *Cryptostylis* it would be interesting to learn whether the custom extends to the extra-Australian species. Altogether some 17 species have been described. According to Dr. R. S. Rogers (*Trans. Roy. Soc. of S.A.*, 1923) the genus is distributed from Ceylon through the Malay Archipelago to New Guinea. It has also been reported from Formosa, and recorded in Java, the Philippines and several South Pacific islands.

Mr. Nubling has sent me beautiful drawings of three extra-Australian species, *C. fulva* (New Guinea and Mandate Territory), *C. papuana* (Dutch New Guinea), and *C. arachnites* (Java). Outwardly these so closely resemble *C. subulata* that one would expect them to be pollinated by the same agent.

Both in Victoria and New South Wales flowers of *Cryptostylis* have been abundant this season, and I am greatly indebted to Mr. E. Nubling and the Rev. H. M. R. Rupp for generous supplies of *C. erecta* for my experiments.

WINTER QUARTERS.

Writing to the Editor from Mulka, via Marree, South Australia, on March 23, Mr. George Aiston says: "I will try to get something for the Field Naturalists' Club's exhibition, but nearly all of our lizards hibernate during the winter. I have a pair of sand-lizards in my bathroom, but they will disappear in a week or two. At the first splash of the water in the morning they are out to catch the small beetles and other things that take cover under the grating below the bath. They have been in the bathroom for years. Mrs. Aiston had a family of lizards in the goatyard. They always came out directly she started milking. Every winter they would dig-in, and she would not see them until the warm weather had settled in. The same thing applies to our marsupials. I would like to get you some of our tiny marsupial mice; they are lovely things and very easily tamed. But I have not seen one this year. We used to find them in the water drain every morning, but they seem to have disappeared. The drought appears to have killed off everything except the birds. Mention of birds reminds me that I have about 20 Seagulls here. They have been here for about a month. The blacks get quite worried about them. They ain't blackfella bird."

NOTES ON NATIVE WELLS.

BY B. L. HORNSHAW.

Recently, in company with Mr. W. Thorpe, Ethnologist of the Australian Museum, and several others, I set out for a day's tour in quest of aboriginal carvings in the Kurin-gai Chase. On the way, we inspected two Bora-nores, near Duffey's Forest, where wonderful examples of native art exist.

The first "art gallery" we visited is described in *Coo-ee Talks* (page 86). After studying this group, we went to the "Lyre Bird" group, described in *Victorian Naturalist* (February, 1930). The party was keenly interested in these unique examples of primitive art. At each group are two native wells, which probably played some part in the Bora ceremonies. In the first group



Photo by B. L. Hornshaw

Fig. 1—Aboriginal Rock Carving and Well on a Bora-nore of the Cammeray Tribe, near Duffey's Forest, N.S.W.

each well is at the side of a small stream, and eight mundoie or ghost footsteps lead to them. On the edge of the lower well or basin is a carving depicting a shield, a sacred symbol of the aborigines. (Fig. 1.)

The wells at the second group are supplied with water only when it rains. One was still full when seen quite recently. Around these two wells are many interesting carvings depicting birds, mammals and fishes. Between these two series of carvings, and a little to the south, are two more small wells—14 inches in diameter and 12 inches in depth. (Fig. 2.)

What interested me most was the fact that the aborigines had cut small grooves or gutters above to carry the water away from, instead of into, the wells. Why they went to this trouble is a mystery. I believe that these wells were cut out of the solid rock, and used for mixing a strong drink, composed of honey and herbs. This drink was only for festive occasions, after a Bora ceremony, for instance, when a banquet usually was held.

On a Bora-nore, called Flatrock, near Manly, are three neatly-cut wells. The stone tool marks can still be seen. In this case grooves are cut from a soakage above to carry the water into the first well. Grooves also drain the water from one well

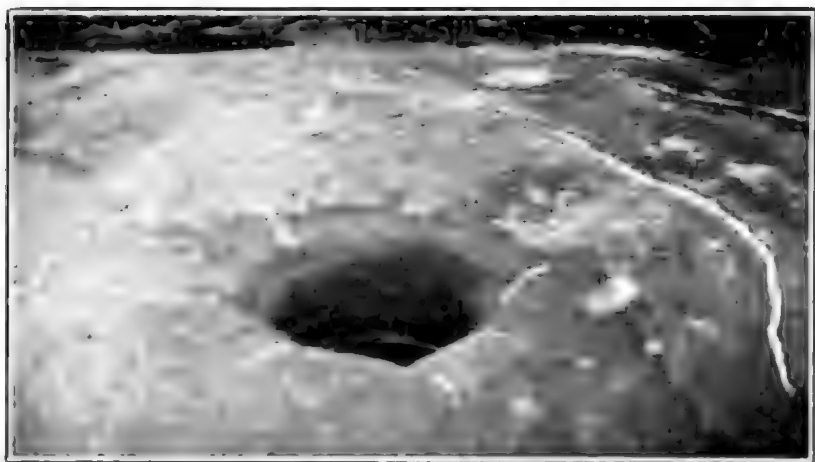


Photo by B. L. Hornshaw.

Fig. 2—Native Well between French's Forest and Duffey's Forest, N.S.W.

to the other, which shows that this was a catchment area for drinking purposes. No running water being near at hand is a fact which would seem to prove this story.

During the day we were successful in finding many examples of native art, also 14 native wells. After careful study of the wells, I would classify them into three types: (a) Those used for drinking purposes; (b) those used as sacred fonts during the Bora ceremonies; and (c) those in which concoctions or beverages were mixed. There is much of mystery about the use of some of these wells, and I would be glad if any members of the Field Naturalists' Club could throw any light on the subject. I feel sure the wells played a very important part in the religious ceremonies and customs of the aborigines.

BIRDS AT EILDON WEIR.

Situated just below the junction of several permanent streams with the Goulburn River, the juxtaposition of two outlying spurs, named Mounts Pinninger and Sugarloaf, on either side of the river, forms an ideal site for the construction of the great reservoir that has been recently completed.

An immense quantity of water has been impounded which, stretching far up the valleys of the tributary streams, of which the principal are the Delatite, Howqua, and Big Rivers, as well as that of the Goulburn, forms an impressive series of waterways not to be equalled in the State. The country is very hilly with the timbered ranges, more or less uniform in height, rising steeply from the water. To the south, the huge, shapely bulk of Mt. Torbreck, with an altitude of 4600 feet above sea level, dominates the surrounding hills.

Below Eildon Weir, which at the time of my visit stood at about 90 feet above river level, cluster the extensive constructional works. Staff residences and huts of the employees, with messrooms, shops, and a school, are on higher ground. The wide road, once a highway, but now terminating at the Weir, forms the main street of this mushroom township, and contains many large eucalypts. In these and the neighbouring timbered paddocks was a wealth of bird life. Perhaps the parched condition of the country, which had been practically without rain for three months, accounted for the congregation of birds in the river valley.

From tree to tree flashed the bright plumage of the parrots. Rosellas, both the crimson and the green species, were numerous, but the former were the more plentiful and also the more confiding. Small flocks of pretty little Green-backed Parrots were always about, and screeching mobs of Green Lorikeets sought the nectar-bearing blossoms of the gums. Down stream, where the valley opened up and maize was grown, White Cockatoos were frequent and unwelcome visitors, but the grating of the Gang Gangs was heard daily in the village. The Black-backed Magpie was everywhere and its tuneful warble dominated the early morning bird orchestras.

Starting a little after sunrise, flocks of Bell Magpies arrived daily from the hills and went methodically through the township, visiting every backyard in search of kitchen scraps. It was among these that an instance of the sympathy that is known to exist among birds was noted. One was observed to be minus the greater part of its upper mandible, and, being unable to dig into the rubbish heaps with its bill, like the others, waited patiently beside a busy worker and was allowed to participate in the find. To take the food, it had to lay its head sideways on the ground.

These birds were not in evidence after mid-day, but in the afternoons White-winged Choughs went over the same ground. Grey-crowned Babblers in small flocks, and Friar Birds and Noisy Miners, representing the honeyeater family, were always in the big trees.

Around the dead trees standing in the grass paddocks, "Merops the Beautiful" vied with the Woodswallows in graceful flight. The stony islands in the river-bed below the Weir were a favourite rendezvous for Herons. They fished quietly there, but as soon as the men knocked off work on the spoil banks and coffer dams, flew upstream to see what had been uncovered. Two or three more venturesome ones would always stay near the workmen, to pick up the yabbies disturbed from beneath the stones. These Herons were mostly the White-fronted species, but frequently a White-necked Heron or a Night-Heron was conspicuous among them. As an indication of their numbers, on one occasion 26 were counted perched on a branch of a submerged tree, with more than a dozen in sight on the islands. When disturbed they invariably protested harshly.

The climax of bird observation came on a brilliant April day, when a motor boat excursion was made on the lake. Crossing the mile-wide basin, we chugged up the submerged course of the Goulburn through avenues of dead tree-tops, everywhere disturbing large flocks of waterfowl. Ducks and Teal in hundreds rose high above, while Coots, Moorhens, and Grebes splashed along the surface of the water. The large-headed Musk Ducks made a more dignified retreat. Harriers and Brown Hawks were seen in all directions, perched on the drowned trees or sailing on aeroplane-wings, and adding their shrill cries to the clamour of the waterfowl. Every now and then a tree would come into view with its naked branches apparently loaded with white "fruits." The binoculars showed these to be either White Ibises, Spoonbills, or the white breasts of the Pied Cormorants. There was never more than one species of bird on each tree. They would not allow a close approach, although the ducks, from their very numbers, were frequently within gunshot. A long distance shot at a flight of Black Cormorants winged one, but it was not recovered.

At the head of the flood water, about 12 miles from the Weir, the water became shallow and we anchored for some fishing. While waiting, a Platypus rose alongside, and another was seen a little distance away. Later, in the Big River, one was seen placidly floating where some big trout were leaping. Here, also, a Kookaburra was observed to dash repeatedly into the water after small fish, in the approved Kingfisher style.

SOME PLANTS OF THE NORTHERN MALLEE.
(Part I.)

BY H. B. WILLIAMSON, F.L.S.

Under this head I propose to give some results of my field-work during a visit to the Murrayville and Mildura districts in October, 1928, combined with observations made at the National Herbarium in connection with the same.

Many of the plants in those districts are common in the desert country of Central Australia and Western New South Wales, and might be spoken of as the "desert plants of Victoria," only that I do not agree with the term "desert" as applied to any tract of land in Victoria. Probably the sandy nature of the belts of country running across the north-west part of the State has suggested the name, for indeed those belts are almost pure sand; but unlike a true desert, they are covered with a vegetation remarkable for its varied character and its attractive flowers.

Of those Victorian plants which extend into the true desert country of South and Central Australia, all do not grow in the sandy areas of our State. Some are found in the limestone, and others in the red loam and the good agricultural areas, and some indeed in all of these.

The plants I propose to discuss are those either doubtfully recorded for Victoria or rarely collected or else represented by wrongly determined specimens in the National Herbarium. A great number of specimens in that valuable collection were in years gone by either laid aside for determination when more fully investigated in the field, or else were, in the pressure of work, labelled in error. Many of these are found in what are known as "supplement parcels." Fortunately, they have dates and localities attached, which render them valuable as objects of study. May I here digress to give a word of warning to collectors, botanical and otherwise. Do not neglect to place dates, localities and collectors' names on your specimens. If I were offered the choice of two similar collections, one with botanical names only, and the other with only dates, collectors' names and localities on the labels, I would choose the latter, for the specimens carry determination data with them, and the other particulars are to the good.

With regard to the determination of the plants I propose to deal with, it must be done in the light of Floras, compiled by enthusiastic workers of recent years—some of whom have passed away—and these Floras, together with the aid of specimens determined by their authors, as well as by the field work now being carried on, place the worker of to-day at an advantage, provided that he can keep a clear head when confronted with cases where conflicting recorded opinions threaten him with despair.

Leptorrhynchus panaetioides, Benth.

A white cottony form of this plant grows at Mildura on the roads in the Eastern part of the town, the specimens noted being only about 6 inches high. Benth. says it "has something of the habit but not the involucre of *Ixiolaena leptolepis*. It is evidently nearly allied to *Leptorrhynchus squamatus*, but more erect and cottony, the peduncles without scarious scales, and the involucre more hemispherical." The outer bracts are thinly scarious, woolly-ciliate margins and dark centre. It has been considered as doubtfully recorded for Victoria, specimens being labelled "Murray" or "Murray Desert." As will be seen in the following discussion it must now be placed on the Census for N.W. and S. of the State.

Ixiolaena leptolepis, Benth.

Small bushes of this plant were growing closely associated with the *Leptorrhynchus*, and in my comparative study of the two with specimens in the National Herbarium, I found that many specimens of the *Leptorrhynchus* were labelled either "*Ixiolaena leptolepis*," "*I. tomentosa*," or "*I. tomentosa* var. *leptolepis*," and there is evidence that Mueller at one time regarded these two species as one. Sondr. in *Linnaea* XXV., 504, places *I. leptolepis* as *I. tomentosa* var. *glabrata*. Benth. placed them apart chiefly on the shape of involucre, but *I. tomentosa* still remained on our Census, partly because of the confusion arising with doubtful synonymy, and partly because of the general resemblance of *Leptorrhynchus panaetioides* to *I. leptolepis*. The former of these grows at Little River (A.C.F. Gates, April, 1923), and on the Keilor Plains (C. Walter, 1900), both recorded in the *Naturalist* as *I. leptolepis* for the South. Some collectors evidently could not reconcile the two plants, for some of the Wimmera specimens of *L. panaetioides* are labelled "*I. tomentosa*." The following key shows the position of the three plants:—

1. Outer involucre bracts thin and scarious,
with woolly-ciliate margins, brownish tips
and a dark or greenish centre *Leptorrhynchus panaetioides*.
N.W., S.
- All involucre bracts herbaceous or the inner
ones shortly scarious at the tips *Ixiolaena* (2)
- Ixiolaena*.
2. Involucre hemispherical, bracts and flower
stalks almost glabrous *I. leptolepis*
N.W. only
- Involucre campanulate, whole plant woolly *I. tomentosa*
Not Victorian

The Mildura specimens of *I. leptolepis* have broader and less cottony leaves, and larger flower heads than those of the Southern Wimmera.